The Chemical Age

VOL LXIV 20 JANUARY 1951 No 1645

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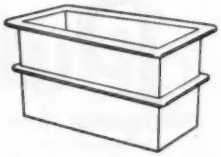

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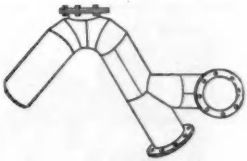

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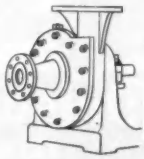

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Science and the Press

IN a recent lecture at the Imperial College of Science and Technology, Mr. Lionel J. F. Brimble, the editor of one of the world's most famous scientific journals, *Nature*, criticised the handling of scientific material in newspapers. He is by no means the first to deplore the fact that science should be handled by reporters who have not been trained in scientific methods. Nevertheless, Mr. Brimble adopted a much more practical outlook than some of the previous critics. Science writers should not attempt to teach science but rather to inspire readers with an appreciation of the true value and aims of science. The articles of science writers should make easy and good reading. And while accuracy is essential, the facts collected should be written up with a context of human interest rather than presented with dull objectivity. In fairness to the newspaper world, it must be observed that there are few scientists who have given enough study to the craft or art of literature to be able to produce material of this nature.

In feeling aggrieved about the way science is handled in the lay Press or about the limited space that is allotted to it, it must be realised that our newspapers are still disturbingly small and that they may, indeed, get smaller. The competition for each half-inch of column space is severe. Scientific material is less easily handled under these conditions than many other types of news or comment. Copy of political, sporting, or human interest value can be cut at the last minute without irreparable damage; a scientific item may become quite unintelligible if a sub-editor is forced to cut out a couple of lines or save a paragraph. There is not an editor in the U.K. who has been able to print all that he would wish or to avoid curtailments that he deplores for the past ten years. If science is to obtain more notice and better notice in the Press, the problems of paper-starved editors must be appreciated. It is not fair criticism to point to columns that to the scientist seem wasted upon trivial topics. Newspapers are aimed at the public taste and scientists' poison may well be laymen's meat. Unfortunately the amount of newsprint available is still insufficient to cater adequately for those subjects or topics for which the public's taste is already known and established. This situation has vicious circle characteristics. It not only prevents an editor giving his readers more scientific reading but it discourages potential science writers from making this specialised type of literature their career. The

result is that when a scientific topic acquires news value or topical importance the task of presentation is likely to be given to an all-round journalist rather than to a journalist with scientific training.

The grievance of distortion or misleading presentation is as old as both science and newspapers themselves. Modern synthetic chemical industry has suffered particularly from the headline that is accurate in a remote sense and appallingly untrue in its effective sense. "Silk Stockings from Coal" is a typical example complained of in the editorial of the *Journal of the Royal Institute of Chemistry* (Part IV, 1949). Here again, however, the critic must make concessions to the expert knowledge of Fleet Street. There has never been a headline that was not to some extent misleading for little that is significant or novel can be expressed in four or five words. The function of a headline is not to inform but to catch the eye, to persuade, to tickle the reading palate. If a thoroughly bad headline doubles the number of readers of a scientific item, it is a valuable headline for science—provided that the item itself is reasonably accurate. Scientists are zealous of their own professional and expert knowledge; they must not forget that newspaper editors are no less expert in their own particular field.

Could the Press do more for science? There will be general agreement with Mr. Brimble's view that our popular penny newspapers, probably the most potent influence upon public opinion, should reflect scientific progress more fully and accurately. Nevertheless, it is a two-way operation, and at least as practical to ask whether science could do more for the Press. Scientists could be more co-operative when information is requested; often, and perhaps as a result of unhappy past experience, they withhold rather than provide material. And when prepared to be helpful, they should accept rather than attempt to reform the technique of newspaper presentation. For example, it may be strictly scientific to insist that a fact is accompanied with several cautionary qualifications, but it is appallingly bad journalism. One qualification per fact is as much as the ordinary reader can accept. The scientists who could at the moment most quickly improve the quality and quantity of Press reportage on science would be chemists who could produce newsprint economically from non-importable materials. Cellulose is the key.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 30s. single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

Notes and Comments

One Hundred Years Old

A SCIENTIFIC centenary that might well be observed this year is that of colloid chemistry. It was in 1851 that Thomas Graham began his famous studies of liquid diffusion and showed that different substances dissolved into a mass of water at very different rates. Acids and salts "invaded" water speedily but substances like glue, starch, or albumin diffused very slowly. This led Graham to experiment with membrane dialysis of solutions and, as is well known, he found that the rapidly diffusing substances passed through such membranes while the slowly diffusing materials were either stopped or passed through with great difficulty. He made the first distinction between "crystalloids" and "colloids" and, although it is now realised that the distinction is not as clear-cut as Graham originally supposed it cannot be disputed that he was the father of colloid chemistry and the forefather of Arrhenius's theory of ionic or electrolytic dissociation. Despite the fact that Graham's work was exploratory and took place in so early a period of physical chemistry, he suggested that colloids had high molecular weights and complex molecules, even postulating that such complex molecules may sometimes be formed by the linking of crystalloid substance molecules. These speculations must be regarded as brilliant anticipations of future research findings. Much that is so spectacularly produced or discovered by the modern industrial chemist rests heavily upon the 1851-1862 contributions of Thomas Graham, president of the Chemical Society at the age of 36 and Professor of Chemistry at Glasgow and University College, London.

Oceanic Phosphates

MUCH too little attention has been given to the vigorous post-war recovery of Nauru and Ocean Island, the sources of phosphate rock for Australian and New Zealand's agricultures. Nauru was heavily attacked by both Germany and Japan and later, when occupied by the emeny, bombed and bombarded by the United States forces. When eventually the Japanese surrendered Nauru was found totally wrecked. All necessary machinery and materials to rehabilitate the island had, however, been accumulated in readiness at Melbourne. This proved fortunate not only for the speed of recovery but also economically for much of the material needed had been obtained at favourable prices. Although the island's shipping had been sunk and its deep-sea mooring system destroyed, phosphate exports were re-started seven months after the Japanese surrender. As so often proves the case whenever complete re-building is necessary, improvement as well as replacement has been possible. The rate at which rock phosphate can be belt-conveyed to the holds of vessels has been increased from 550 tons per hour before the war to 1600 tons per hour. It is now possible to load a 10,000 ton vessel that arrives at Nauru in the morning and so that she steams away by evening. Ocean Island was much less seriously damaged. Though also occupied by the Japanese it was not heavily fortified or used as an air-base. In the year 1949/50 over 1 million tons were shipped from Nauru and more than 200,000 tons from Ocean Island. It is said that the phosphate requirements of both Australia and New Zealand are again being fully met. Indeed, present output exceeds all previous annual figures.

Synthetic Vitamin A

ALTHOUGH the synthesis of vitamin A is an achievement of recent years, reports from the United States show that production development has been extraordinarily rapid since February, 1950, when the first commercial quantities emerged from a New Jersey plant set up specifically

for vitamin A manufacture. Citral, obtained from lemon grass, is the starting material, and this 10-carbon aldehyde is built up into the unsaturated cyclic alcohol, $C_9H_7CH_2OH$, the synthetic vitamin. Unlike fish-liver sources of the natural vitamin, the new factory-built product has no fishy smell or flavour; though to some extent this disability had been overcome by the modern development of halibut liver oil. Unlike many chemical prices in 1950, the price of the synthetic product has fallen during the year. First sold at 30 cents per million units, the price has been reduced to 18 cents per standard gramme containing 1 million units. The natural fish-derived concentrate is also 18 cents per gramme, but the gramme contains a maximum of 700,000 units. It is reported that the fish-liver industry in America is already feeling the effects of this competition. Lower grade oils may hold their position as additives for animal feeding-stuffs. Nevertheless, the factory in New Jersey is said to have a potential capacity to provide the total vitamin A requirements of the United States; and at least three other companies are also producing the synthetic vitamin.

Sharing Raw Materials

AN important step forward in dealing with shortages of raw materials was made recently with the approval of the British-French-American plan to establish commodity groups to secure effective distribution and utilisation of supplies. Some misgivings have been expressed by the smaller countries lest their interests should be overlooked. But international co-operation and action had to be taken in view of the serious effects of shortages already being felt by industry. A sign of the goodwill of the major Powers is the fact that the American Government has suspended for six months the purchase of zinc for reserve stocks. The good faith of the "Big Three" could, in fact, be best demonstrated by tackling at the start the commodities—such as sulphur, zinc, copper, lead, and other materials in which they are most interested—for success in these would encourage hope for a fair deal on other problems. As Mr. Gaitskell said, there is still a long way to go, with difficulties like the membership of the standing committees and the application of their decisions still to be faced. The latter, indeed, is a delicate question, for too strong a line might be mistaken as interfering in the internal affairs of sovereign Governments. Control of consumption of scarce materials for some or all countries may be necessary, but its enforcement will require give and take from all concerned. It is to be hoped that all the 18 Marshall aid countries said to have approved of the scheme will show that the free nations of the West are prepared to co-operate to the utmost to make it a practicable proposition for their mutual benefit.

The Colour Problem

SHORTAGE of raw materials is presenting the paint trade with a list of uncertainties which may tax to the limit its diversity of processes and may, indeed, bring about a fresh campaign of propaganda. Under the zinc allocation scheme zinc oxide, the major pigment for white paints and enamels, is certain to become even more scarce than at present, and there is no alternative material sufficiently plentiful to replace it. Lithopone and titanium oxide are already scarce, and what is more, both require sulphuric acid. Although white lead is at present fairly easily obtainable, any large increase in its use might soon precipitate a shortage. A further difficulty is that rubber manufacturers, pharmaceuticals, and ceramics are to be considered essential users and given priority over the paint trade. Supplies of most materials for paint are, however, short, and the industry is also affected by the lack of tinplate for containers. A scheme may be necessary to persuade people to forsake the pastel tones, which need white pigments, and to popularise again the use of darker paints.

ORGANIC MICROANALYSIS

IN recent years, methods for the micro determination of carbon and hydrogen have shown a decided trend towards simplicity and rapidity. Such a trend is most welcome, as the original combustion methods of Pregl, while valuable at one time, are tedious on a routine basis and impose a strain on the operator.

Thus introducing his topic, which was concerned with modern work on the estimation of carbon and hydrogen on the micro-scale, Mr. G. Ingram, microanalyst of Courtaulds, Ltd., speaking at the fourth meeting of the Midlands Analytical Methods Discussion Group recently, went on to say that the developments in carbon and hydrogen determination methods may be classified under three main headings. These are:—

1. Construction of apparatus.
2. Combustion tube filling.
3. Combustion procedure.

Friedrich's considerably simplified apparatus was the first alternative to Pregl's method to be recognised as suitable for routine analysis. In this method (based on the classical Dënnstedt macro procedure) a flowmeter is used instead of a bubble counter for control of oxygen.

The combustion tube filling consists of platinum contacts only for compounds containing C, H and O; and a boat containing lead oxide to absorb nitrogen and sulphur oxides, if N and S are present in the sample. The lead dioxide also absorbs halogens, but later workers prefer to use a loose roll of silver for the retention of both sulphur oxides and halogens. Ingram replaces the platinum catalysts by silver orthovanadate, which serves both as oxidant and absorbent for sulphur oxides and halogens. The reagent, in the form of granules, is contained in a long porcelain boat and changes colour when exhausted.

Has Found Widespread Use

Within recent years, the "Universal" tube filling of Pregl with some modifications has found widespread use. The filling consists of a layer of silver gauze followed successively by layers of platinised asbestos, copper oxide, silver, asbestos and lead oxide. The combustion zone is electrically heated to about 700° C., the portion containing the lead dioxide being maintained by a separate heater at 185° C.

The lead dioxide absorbent often behaves capriciously, due to displacement of the equilibrium existing between it and adsorbed water, and this leads to errors in the determination. Accordingly, other reagents have been used to absorb the nitrogen oxides. Dombrowski in 1940 suggested moist *p*-aminoazobenzene as external absorbent, but this and alternative reagents generally lose their absorbent properties to some extent after a few combustions.

Probably the best absorbent is manganese dioxide, recommended by Belcher and Ingram. It is used externally between the water and carbon dioxide absorption tubes, and 2 g. will cope with the products of at least 50 combinations. Special precautions are necessary to prevent condensation of water in the beak end of the combustion tube, as often occurs when external absorbents are used.

The Work of Bennett

Mention may be made of the work of Bennett, who carries out the combustion in a stream of nitrogen containing a small amount of oxygen. The tube filling in this case consists of copper oxide and metallic copper, the latter removing nitrogen oxides after combustion of the sample. The need for internal or external absorbents for nitrogen oxides is thus eliminated.

There have been many outstanding innovations in combustion procedure in recent years. Automatic methods of combustion control are preferred by most workers nowadays, but for these procedures to be successful the characteristics of the sample must be taken into consideration, as no two types of compound burn alike.

Although automatic methods for the determination of carbon and hydrogen are convenient from the point of view of routine analysis, they are not quicker than the manual methods. For this reason more rapid methods have been sought. The original "empty tube" procedure of Belcher and Spooner has been modified by Belcher and Ingram to such an extent that a single combustion (including sweeping out) may be carried out in less than 15 minutes.

The combustion is carried out in an empty quartz tube provided with a vertical double-surface chamber which contains a number of baffle plates to ensure complete mixing of the combustion gases with hot oxygen. The oxygen flow rate is 50 ml. per minute. Silver wool, heated in a horizontal tube sealed to the exit of the combustion chamber, will remove sulphur oxides and halogens. A quartz wool plug at the entrance of the combustion chamber will retain any fine carbon particles

which certain compounds produce under the rapid oxidation conditions employed. The oxidation of these particles may then be completed with the movable burner. Nitrogen oxides are removed by manganese dioxide used externally.

Miss B. Bauminger, Ph.D., A.R.I.C., analytical chemist at Fort Dunlop, then took over the discussion.

The Determination of Oxygen

The methods available for the direct determination of oxygen in organic compounds, indicated by Miss Bauminger, may be conveniently classified according to whether the sample is decomposed by (i) oxidation, (ii) hydrogenation, or (iii) carbon reduction methods.

Oxidation methods are unsatisfactory and are mainly of historical interest. They are complicated, and often very indirect and inaccurate; indeed, oxygen may be determined more accurately by difference.

Hydrogenation methods are superior in most respects to the oxidation procedures. The original procedure is generally attributed to ter Meulen, and briefly consists of vaporising the sample in a stream of hydrogen, pyrolysing the compound at a high temperature to carbon oxides and water, and catalytically hydrogenating the products to water, which is then absorbed and weighed.

Hydrogen reduction methods are direct, but suffer from several disadvantages. For example, the catalyst is easily poisoned by sulphur and halogens, and a very unfavourable conversion factor for water to oxygen is obtained (=0.88). Despite these difficulties, several workers have determined oxygen on the micro scale with an absolute accuracy of 0.2 per cent.

Carbon Reduction Method

Carbon reduction methods were introduced in 1939 by Schütze and have almost entirely superseded the older procedures. They have proved of special value in the determination of traces of oxygen in such industrial materials as rubber. Schütze's method is briefly as follows: the organic compound (25 mg.) is vaporised in a stream of nitrogen gas and the cracked products passed over carbon at 1000° C. with formation of carbon monoxide. The carbon monoxide is oxidised by iodine pentoxide to carbon dioxide, which is then weighed. A more favourable conversion factor for oxygen ($O/CO_2 = 0.36$) is obtained than in the hydrogenation method.

Zimmerman adapted Schütze's method to the micro scale, but obtained high blanks due mainly to traces of oxygen in the nitrogen. Unterzaucher in 1940 improved the apparatus considerably and succeeded in reducing the blank to a negligible value by purifying the nitrogen by treatment with copper. A more efficient procedure is as follows: The nitrogen is passed at a rate of 10-12 ml. per minute through a solution of vanadyl sulphate containing amalgamated zinc, then successively through concentrated sulphuric acid, anhydrone and soda asbestos, and then through copper turnings at 500° C. Finally the nitrogen is passed through more anhydrone and soda asbestos.

Some workers prefer helium to nitrogen as the inert gas, but, if the nitrogen is purified in the above way, the blank resulting from its use is negligible.

Unterzaucher added a by-pass to the combustion tube so that air entering the tube with the sample could be removed with a reverse flush of nitrogen. Results were 10-12 per cent low when the carbon was maintained at 1000° C. and it was found that the optimum temperature for the reduction was 1100-1120° C.

Leipert Method Used

The carbon monoxide formed in the reduction was oxidised with specially conditioned iodine pentoxide at 118° C. and the liberated iodine amplified by the well-known Leipert method and then determined.

Bauminger and Polton, who are concerned with the determination of traces of oxygen in rubbers, prefer to determine the liberated iodine absorptiometrically, obtaining a linear relationship between optical density and iodine concentration (calculated as mg. of oxygen). Korshun heated the iodine pentoxide to 130° C. and obtained good results, which indicates that the temperature of 118° C. normally used is not critical. Walton, McCulloch and Smith did not use iodine pentoxide, but determined the carbon monoxide with NSB colorimetric indicating gel.

Difficulties are often encountered with the iodine pentoxide in the Unterzaucher procedure. A most satisfactory method of pre-treating the iodine pentoxide is as follows: Iodine pentoxide in pinhead size granules is heated at 230-240° C. in a stream of nitrogen for several days. After cooling in nitrogen, the iodine pentoxide is packed in the reaction tube and heated for a few days at 118° C. until the evolution of iodine has fallen to a minimum.

Probably the most frequent source of error in the determination of oxygen is the carbon used for the reduction. Aluise and his co-workers found that graphite gave low results with a high variable blank. Good results were obtained using

commercial carbon black of amorphous structure and of low ash content; laboratory preparations of benzene and acetylene soot were also satisfactory.

The ash content is most significant, since metallic oxide impurities have been shown to be responsible for high blank values. P 33 (thermal black) has a low ash content (0.016 per cent). The fraction passing through a 30-mesh sieve, but which is retained on a 60-mesh sieve, is heated at 500° C. in a slow stream of nitrogen and the temperature gradually increased to 1120° C. and maintained for a period of several hours. Adsorbed oxygen and oxides of carbon are removed by passing hydrogen gas for 2 hours followed by purified nitrogen.

Volatile Constituents Removed

In this way volatile constituents are removed and sintering of the carbon results thereby preventing channelling when the carbon is used in the combustion tube.

Harris, Mitchell and Smith have recently developed a new technique for the determination of oxygen based on a carbon reduction procedure. The sample is vaporised in hellium and the products of the pyrolysis are circulated in a closed system until complete conversion to carbon monoxide is effected. Hydrogen is removed by diffusion through palladium, and the composition of the helium-carbon monoxide mixture is determined using a thermal conductivity bridge.

Several advantages result from this new technique; thus, large samples may be used, the course of decomposition and conversion may be followed, and the use of specially purified helium is not necessary. Again, a complete conversion to carbon monoxide results.

The main disadvantage is that only carbon, hydrogen and oxygen should be present in the sample. It is of interest to note that, although the determination of oxygen is of the utmost importance in characterising organic compounds, the method is not used in this country for this purpose. In Germany, on the other hand, most micro laboratories are carrying out routine determinations of oxygen in organic compounds. As far as is known, the only two oxygen determination apparatus in this country are used solely for the determination of oxygen in rubbers.

Rayon Institute Established

The first State Technical Institute in Poland for studying rayon fibres has recently been established in Wroclaw. Its chief purpose is to train specialists for rayon plants.

Underground Gasification

THE experimental usage of underground gas by working from the surface was described by Dr. H. Roxbee Cox, chief scientist to the Ministry of Fuel and Power, speaking in London recently at a luncheon of the Coal Industry Society.

The research had been carried out in two ways. First by creating a U-shaped channel with two vertical holes in a coal seam, and secondly, by connecting two vertical drillings with pneumatic pressure. A system had been started on 13 July by the first method, and was still working.

The second and more exciting method had been working for just over one month.

There was a great deal of coal in this country not worth mining because it was too dirty, in too narrow seams, or too deep. Much of this could be used by the method of underground gasification. From coal which was half dirt, lying in a wet seam of only about 18 in. thickness, gas had been obtained of an average of about 75 British thermal units a cubic foot.

Such a gas could be readily used as the fuel for a gas turbine engine generating electric power, and it was with the vision of a plurality of vertical drillings connected to a number of gas turbines generating power that experiments were being carried out, to which the National Coal Board had recently decided to give direct help.

Dr. Cox described new experiments with a gas turbine with pre-heating apparatus which would burn firedamp, or methane, found in the ventilating air in upcasts from mines.

Sir Alfred Egerton, he said, had carried out experiments which showed that a 1 per cent mixture of methane in air would burn easily if heated to 980° C. Given good fortune, they would see an engine working at a pit by about the middle of next year.

Rhodesian Mining Progress

Important deposits of chrome, asbestos and gold are attracting mining operators to Mashaba, Southern Rhodesia. The most up-to-date asbestos mill in the Colony, that of African Associated Mines, will be in operation early this year, milling 1000 tons of raw asbestos a day.

German Atom-Scientist Dies in Russia

Professor Gustav Hertz, a German atomic scientist, has been killed during the course of atomic energy experiments in the U.S.S.R. Professor Hertz, who was taken by the Russians to an unknown part of Central Russia after the war, shared the Nobel Prize with Professor Jakob Franck in 1926. He was 63.

FESTIVAL TRAFFIC PLAN

TRADERS and business concerns operating their own "C" licensed commercial vehicles in or through the London area, and apprehensive of the effect that traffic congestion will have on their vans and lorries during the Festival of Britain period, will be interested to know that this problem has been tackled by the traffic committee of the London and Home Counties Area of the Traders' Road Transport Association, the national organisation for "C" licence operation.

The committee has produced a memorandum which has been forwarded to the London and Home Counties Traffic Advisory Committee outlining a number of short-term proposals to deal with London's traffic congestion. Members of the T.R.T.A.'s traffic committee are themselves the transport executives or heads of transport departments of trading and industrial undertakings in the London Area, and they have approached the matter from the point of view of traders, whether small or large, who have to render essential supply services with their vehicles.

From this angle the committee ask to be accepted as "beyond controversy" the principle of commercial vehicle operators having direct access to business premises, shops, restaurants, markets, etc., with priority over other vehicular traffic." They also request priority over passenger traffic for commercial vehicles engaged on collection and delivery.

One of the committee's proposals is that London should be "ringed" on all main roads with "routing posts" staffed by traffic experts, capable of issuing on request "route cards" to all road users into or through London.

Canadian Zinc Project

THE PRESIDENT of Consolidated Mining and Smelting Co., Mr. R. E. Stavert, has announced construction projects amounting to a total of $15 million to be undertaken by his company.

At Trail, the company will build an addition to its electrolytic zinc refinery at an estimated cost of about $3,200,000. This new unit will increase the production of refined zinc by about 70 tons per day and will use 15,000 h.p. of electrical energy. The extra plant capacity is required to treat the increasing quantity of zinc ores and concentrates which are becoming available from numerous mining operations in British Columbia, as well as the zinc which will be available from the Bluebell mine in Kootenay Lake and other properties owned by the company which are now being prepared for production.

The company has also decided to increase its fertiliser production by building a plant at Kimberley, B.C., with a capacity of 70,000 tons per year of ammonium phosphate, at a cost estimated at approximately $9 million. This plant is being constructed for the purpose of meeting the increasing demand on the Canadian Prairie for ammonium phosphate fertilisers which have proved to be successful in increasing the yield of wheat and other grain crops, sugar beets and other farm products. The new plant will include a unit for the treatment of tailings from the company's Sullivan mine to produce about 300 tons per day of sulphuric acid. The sulphuric acid will be used for the treatment, of phosphate rock from the company's mines in Montana.

U-235 Production in U.S.A.

A NEW plant further to expand United States capacity for producing uranium-235 for use in weapons or in fuel elements for nuclear reactors will be erected by the U.S. Atomic Energy Commission at Paducah, Kentucky. When completed, the new facilities will be operated for the AEC by the Carbide and Carbon Chemicals Division of the Union Carbide and Carbon Corporation, New York, which also operates the AEC's major production facilities at Oak Ridge.

The principal component will be a large gaseous diffusion plant for the separation of fissionable uranium-235 from non-fissionable uranium-238. The new plant will supplement the extensive U-235 separation facilities now in operation or under construction at Oak Ridge, Tennessee.

The gaseous diffusion process is one in which uranium-hexafluoride, in gaseous form, is pumped through thousands of extremely fine barriers. Since U-235 atoms are slightly lighter and therefore travel slightly faster, they strike the screens and pass through the holes with greater frequency than do U-238 atoms. In this process, the fissionable U-235 atoms, which make up only one part in 140 of natural uranium, are gradually separated and concentrated.

Operation of the plant will involve no appreciable radiation problems. In the five years the similar Oak Ridge gaseous diffusion plant has been working, not a single employee has suffered a radiation injury.

PHOSPHORUS AND ITS DERIVATIVES

PROGRESS made in the development of the numerous phosphorous derivatives and their increasingly wide range of industrial applications is well exemplified in the celebration this year of the centenary of a well-known firm of phosphorus manufacturers.

When Arthur Albright established his phosphorus works at Oldbury, near Birmingham, production was confined to yellow phosphorus for match factories, derived mainly from calcined bones. The founder of the business died in 1900, by which time non-toxic red phosphous had become the basis of the match industry and another match making material, phosphorous sesquisulphide, had also been introduced.

The end of the century had also seen a limited output of phosphoric acid by the, now obsolete, process of treating bone ash with sulphuric acid and by burning phosphorus in small lead chambers with moist air.

The first world war with its new demands on industrialists gave a fresh impetus to development and research. With its resources of scientific and technical knowledge, Albright & Wilson were able to take full advantage of the opportunities thus presented. The range of production was rapidly increased and the company entered upon an unbroken period of expansion which is still continuing.

At the beginning of the century about 70 per cent of the total output was for the match industry; to-day match-making materials account for only some 4 per cent of the combined production of the company's two existing factories at Oldbury and Widnes.

Demand Still Ahead

Despite its rapid growth the company, in fact, has never succeeded in catching up with the ever-increasing demand for its established products and for those which are constantly being developed. In order to meet its potential requirements of both the home and export markets a programme has been entered upon for increasing its production capacity in Britain, Canada and Australia.

In Britain the current expansion programme includes the establishment of a new factory at Portishead near Bristol which, it is hoped, will produce sufficient phosphoric acid for the production of another 50,000 tons a year of tripolyphosphate at Kirkby, in South Wales, where a second new factory is being established.

Organic phosphorus compounds, upon which the company is spending considerable money and research, will be manufactured together with silicones in a third new factory at Barry Docks in Wales. Production at all three places is expected to begin in 1953, or at the latest 1954. Much money is also being spent on extension of the research facilities which are the foundation of the company's success. A new laboratory is being established at Oldbury and another at one of the new factories. To finance all this programme the company's capital was recently increased by £2 million.

Impressive List of Products

Over sixty different chemicals now manufactured and no fewer than 36 main types are included in the export list of phosphorus products.

More than a thousand workers are employed at Oldbury, the oldest and biggest of the British factories, where phosphorus is produced from phosphate rock imported from Florida and also, to a more limited extent, from Morocco. The rock is imported in shiploads of several thousand tons, its intake being a major handling operation. There are six silos with a total capacity of 25,000 tons. The phosphate rock is carried to the top of these silos in a drying, mixing and feeding band, together with other ingredients for charging the battery of six electric furnaces.

In these furnaces is smelted a mixture of calcium phosphate, silica (as a flux), and carbon in the form of anthracite or coke. At the high temperature of the furnace the silica displaces phosphoric oxide and forms calcium silicate, the phosphoric oxide being then reduced by the carbon to phosphorus vapour and carbon monoxide. The mixed gases are led away into condensers, where the phosphorus is liquefied and the carbon monoxide burned. The calcium silicate is periodically discharged from the furnace as molten slag.

This electric smelting operation is the basis of modern phosphorus manufacture. From it are derived the two main series of processes by which most of the final derivatives are made. One group makes use of solid elemental phosphorus, which is spontaneously inflammable in air at 34°C. and is therefore extruded into shallow water-filled troughs. This material is so dangerous that it can only be handled under water. It is packed in water-filled containers for delivery to manufacturers of non-ferrous alloys, vermin poisons, and smoke-producing compositions.

The second group of products is based on pure phosphoric acid made from distilled elemental phosphorus. Each product is manufactured in a separate plant. A feature of the factory is the small labour force employed on the actual production units, as compared with the large complement of skilled tradesmen engaged in the maintenance of these units.

Of the numerous derivatives of phosphorus manufactured, one of the first to be developed was acid sodium pyrophosphate. This product was introduced during the first world war, when chemists were compelled to find a substitute for two scarce ingredients of aerating powders, namely tartaric acid and cream of tartar. Nowadays almost the whole of the baking and confectionery trade relies on acid sodium pyrophosphate, which is used with bicarbonate of soda as a baking acid and is also the basic ingredient of 80 per cent of all domestic baking powders.

Flour Raising Ingredient

Another derivative, acid calcium phosphate, is used in cake flours, pudding mixtures, and as a flour improver, and has become the indispensable raising ingredient for 90 per cent of all the self-raising flour manufactured in Britain. Both phosphates are also used to prevent " rope disease " in flours of high extraction. From an initial production of about 500 tons annually the output of acid calcium phosphate has swollen to many thousands of tons, while the demand for acid calcium phosphate has correspondingly increased.

Even more spectacular has been the progress of phosphorus derivatives in the field of the soap and detergent industries. Many of the best proprietary detergents are at least partly dependent for their efficacy on the emulsifying and dispersing power and the sequestering properties of their phosphate constituents. One of the principal reasons for the establishment of the new factories is to increase supplies of sodium tripolyphosphate to detergent manufacturers. This chemical has valuable surface-active properties in very dilute solutions.

Another notable compound is sodium metaphosphate, which among its many interesting properties has the ability to sequester ions. This enables it to dissolve or prevent the separation of insoluble soaps, so that in many detergent operations it can be used either to remove deposits already formed or to avoid deposits which prevent the real detergents from exercising their full power.

In the textile industry sodium metaphosphate is widely used in the scouring of woollen and worsted piece goods, the kier boiling of cotton and the degumming of silk. Added to the first hot rinse of any of the normal washing processes, it also prevents any greying of laundry work which may be caused by the deposition of insoluble soaps during the rinse. Catering establishments use it as a constituent of an alkaline cleaner for dish washing. The principal application of sodium metaphosphate in the leather industry is as a pretanning agent, where it has the advantage of improving the penetration of vegetable tanning agents or syntans.

Phosphates are used in oilfields and refineries, not only in water treatment, but also in the conditioning of drilling. Their properties are such that they serve as deflocculants, as calcium-sequestering compounds, and for *p*H adjustment. Sodium metaphosphate and sodium pyrophosphates are all used in this way. A solution of tripotassium phosphate is the absorbent in a process for the removal and recovery of hydrogen sulphide from natural refinery gases.

One of the most notable applications of sodium metaphosphate is in threshold treatment, a process in which water is treated with very low concentrations of this chemical. This treatment prevents scale formation in heaters, condensers and other plant in which waters with a high temporary hardness are raised in temperature. It is also used for the stabilisation of hard waters to prevent the formation of calcium carbonate scales when alkalis are added, to inhibit the corrosion of iron and steel mains by soft waters of the moorland type, and to prevent the separation of iron compounds from well waters containing ferrous bicarbonate in solution.

Used for Water Conditioning

In power plants where steam is raised in high-pressure boilers, as well as for industrial and marine boilers working at 200 p.s.i. sodium metaphosphate is used in the final conditioning of boiler water, often eliminating the risk of feed-line deposits which are formed when orthophosphates are used. In the boiler, sodium metaphosphate gives a lower alkalinity than either trisodium or disodium phosphate, frequently resulting in a reduction of the amount of blowdown. This treatment is now standard practice for nearly all boiler installations at power plants.

An interesting development, which originated in Germany a few years ago, is the production of insecticides based on organic phosphorus compounds. Exhaustive tests have been undertaken in Britain and the company is now producing insec-

ticides, which are proving particularly useful for controlling aphids and mites. Their insecticidal power is mainly dependent on their content of tetraethyl pyrophosphate.

An important advantage is that toxicity is lost some 24 hours after spraying, so that these insecticides can safely be used on crops which are almost ready for gathering. Another point is their effectiveness at low temperatures. Other organic compounds which have useful insecticidal properties are parathion (diethyl paranitrophenol thiophosphate) and schradan (Tetrakis dimethylamid pyrophosphate). These materials are toxic to mammals and require careful handling.

A mixture of alkyl phosphoric acids is produced by the reaction of phosphorus pentoxide and an aliphatic alcohol. Ethyl phosphoric acids made in this way include the liquid bonding agent in the Ceremold process for precision casting, while butyl phosphoric acids are used in plastics such as urea-formaldehyde as catalysts and accelerators. In addition to the acids some salts are also in commercial supply, usually as concentrated aqueous solutions, one application being as an anti-freeze in fire extinguishers.

The ethyl ammonium phosphates have been suggested for fireproofing and the sodium ethyl phosphates as humectants. Another organic compound manufactured is ethylaniline phosphate, which is added to shellac as a corrosion inhibitor to prevent discoloration when packed in tinned containers. Phosphorus chlorides and bromides are used in the synthesis of organic compounds; for example, tricresyl and triphenyl phosphates.

Calcium and sodium phosphides react with water to produce phosphine, a gas which ignites spontaneously in air, and are used in the manufacture of marine signal flares. Iron phosphide or ferrophosphorus is added to steel to increase the phosphorous content, while zinc phosphide is an effective poison for rats and mice.

Monammonium Phosphate

The numerous products of the British phosphorus industry also include, *inter alia*, monammonium phosphate, which is extensively used for fireproofing timber, and phosphorus pentoxide. The latter is an extremely powerful drying agent used in the manufacture of electric lamps and in other processes involving high vacua, as well as in laboratories generally.

Phosphoric acid from which the various phosphate derivatives are obtained has, of course, its own field of applications, which is extremely wide. Phosphoric acid B.P. is used principally in chemical processes, tonic medicines and phosphate drinks. Technical phosphoric acid is used in the pickling of iron and steel plates and is also the basis of a number of rust-proofing treatments. A phosphoric acid treatment is sometimes applied to galvanised iron which is subsequently to be painted, the articles being immersed for a few minutes in a 2½ per cent solution of phosphoric acid maintained at about 80°C. This provides an etched surface for the paint and is particularly suitable for the treatment of galvanised pipes.

Electrolytic Polishing of Metals

A more recent application of phosphoric acid is its use in the electrolytic polishing of metals. In this process the article to be polished is made the anode and "deplated" by the application of an electric current. The cost is lower than that of mechanical polishing and the process can be applied to articles which it would be impracticable to polish mechanically. A well-known example of this field of applications is the Battelle process for the electrolytic brightening of aluminium.

Since December, 1946, Albright & Wilson, Ltd., have been distributing a wide range of silicone products, manufactured by the Dow Corning Corporation in the United States, who were the first producers of silicones. In view of the favourable outlook for these materials it was recently decided to manufacture silicones in Britain. The new factory at Barry Docks is being equipped with the special plant required for their production. To sell and give technical service on the products a new company, Midland Silicones, Ltd , has been formed.

Apart from supplying the phosphorus used in a high percentage of the entire world's match production, the factories established by the British company of Albright & Wilson, Ltd., and by its subsidiaries in the United States, Canada and Australia produce a remarkable variety of chemicals which are of vital importance in both war and peace.

The company also owns Thomas Tyrer & Co., Ltd., manufacturers of pharmaceutical chemicals at Stratford, and has a substantial interest in the Albright & Wilson Match Phosphorus Co., Ltd., and in Albright & Wilson (Ireland), Ltd. Its associated companies include Clifford Christopherson & Co., Ltd., the Antelope Company, Holmes Marine Life Protection Association, Ltd.

"TAPLINE" OIL FOR U.K.

Arabian-Mediterranean Link Working

THE first cargo of 15,300 tons of Arabian crude oil to reach the United Kingdom from the Trans-Arabian Pipe Line Company's new pipeline linking the Persian Gulf with the Mediterranean arrived at Fawley on 7 January. A further cargo is expected about the middle of the month.

"Tapline," as this new line is called, has its beginning in the Abquaiq oil field of Saudi Arabia. A line to the Arabian-American Oil Company's (Aramaco's) refinery at Ras Tanura branches off the main line from Abquaiq and from this juncture the main line extends 1067 miles across the desert until it reaches a point four miles south of the biblical port of Sidon, in the Lebanon. Until three years ago no vehicle had ever travelled the entire route.

Built at a cost of $200 million, this pipe line will make available large quantities of crude oil on the eastern shore of the Mediterranean. A fleet of 65 tankers will be saved and the 3500-mile haul round the Arabian peninsula, up the Red Sea and through the Suez Canal, will be obviated.

The present capacity of the pipe line is 300,000 barrels a day. The annual output of this line will reach 110 million barrels, approximately 15 million tons, or not far short of the whole of the United Kingdom's refinery production of crude oil in 1952.

Licensing of Iron and Steel

RESTRICTION of production of certain forms of iron and steel to Iron and Steel Corporation and publicly-owned companies, except under licence or in small quantities, will become effective on 15 May, 1951.

Under Section 29 of the Iron and Steel Act, 1949 it will be illegal for any person (other than the Iron and Steel Corporation of Great Britain and the publicly-owned companies) to carry on any of the activities specified in the second schedule of the Act except under licence from the Minister of Supply, unless the output of the products of any such activity does not exceed 5000 tons a year.

These activities are: the working and getting of iron ore; the smelting of iron ore in a blast furnace with or without other metalliferous materials; the production of steel (including alloy steel) in the form of ingots; the changing of the cross-sectional dimensions or cross-sectional shape of steel by hot rolling in a rolling mill.

The Minister is required to issue a licence, under Section 30 of the Act, subject to certain prescribed conditions, to any business which was carrying on any of the second schedule activities on 24 November 1949 and which furnishes not later than 15 April 1951 the particulars specified in that section.

Anyone desiring a licence under this section who has not already heard from the Ministry of Supply should submit to the Ministry not later than 15 April 1951 a statement of the particulars required under the section.

Although any person whose production in respect of the second schedule activities does not exceed 5000 tons in any year is not required to obtain a licence, it will be of advantage to those businesses whose average annual output in 1946 and 1947 exceeded 2500 tons, if a licence under Section 30 is obtained.

Scottish Rivers' Pollution

NEED for fresh legislation to ensure that some improvement is brought about in the state of Scottish rivers was emphasised in the report recently published of the Rivers Pollution Sub-Committee of the Scottish Water Advisory Committee.

An analysis of 526 pollutions reported showed that 233 were from industrial causes. Of these, the committee remarked that industrial pollution need be tolerated only in the case of existing industries or where no alternative location exists, and then only if the best practicable means of treatment have been provided.

In order to bring about an improvement the committee recommended the following changes in the law:—

Bringing under control pollutions at present exempt; the inclusion of tidal waters; giving industry a clear right to discharge suitable trade waste-waters and effluents into public sewerage systems; the setting up of an advisory committee; widening of the areas of administration to provide for fewer and stronger rivers pollution prevention authorities; and the institution of standards for regulating the discharge of effluents into rivers and other waters.

New standards should be devised to govern the quality of effluents discharged into the rivers. The first step was to devise tests to determine the effect of an effluent on a receiving river.

Ten new areas were suggested for the whole country, to be designated by Orders made by the Secretary of State for Scotland.

BASIC CHEMICALS IN OCTOBER

Some Improvement in Production

PRODUCTION of basic chemicals in October, 1950, was marked by improvement in a number of items compared with the same month of the previous year. Increases revealed by the current issue of the *Monthly Digest of Statistics*, No. 60, December, 1950 (HMSO, 2s. 6d.), included the following (in thousands of tons): sulphuric acid 145.1 (144.0); virgin zinc 5.61 (4.99); refined lead 7.55 (2.42) and (in mil. bulk gal.) industrial alcohol 4.02 (2.23). Exceptions were molasses, superphosphate and compound fertiliser in all of which output was lower.

Consumption was reduced in superphosphate, compound fertilisers, liming materials and phosphate rock, but was higher in sulphur, sulphuric acid, and tin. Stocks of sulphur, molasses, industrial alcohol, copper and zinc were all reduced.

Estimated numbers employed in all sections of the chemical and allied trades in October, 1950, totalled (in thousands) 455.1 which was 2.1 higher than the previous month and 11.0 more than in October, 1949. Distribution of workers was: coke ovens, chemicals and dyes, explosives, etc., 261.9 (192.9 men, 69.0 women); pharmaceuticals, toilet preparations, etc., 86.2 (43.7 men, 42.5 women); paint and varnish 39.2 (27.8 men, 11.4 women); mineral oil refining, other oils, greases, glue, etc., 67.8 (54.5 men, 13.3 women).

	October, 1950 Thousand Tons			October, 1949 Thousand Tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	145.1	151.0	—	144.0	144.0	—
Sulphur	—	29.8	80.8	—	27.0	85.5
Pyrites	—	15.3	78.8	—	19.2	67.1
Spent oxide	—	15.8	191.6	—	16.2	175.2
Molasses (cane and beet)	59.3	57.6*	186.9	70.9	31.1*	246.8
Industrial alcohol (mil. bulk gal.)	4.02	3.76	0 58	2.23	2.87	3.27
Ammonia	—	5.76†	9.12	—	6.17	5.34
Superphosphate	12.4	16.9	—	19.0	19.1	—
Compound fertilisers	159.8	85.0	—	164.2	122.8	—
Liming materials	—	531.8	—	—	774.1	—
Nitrogen content of nitrogenous fertilisers	21.31	18.12	—	19.65	19.29	—
Phosphate rock	—	73.2	318.3	—	96.5	218.9
Virgin aluminium	2.53	17.3	—	2.24	15.2	—
Virgin copper	—	29.4	120.4	—	28.3	143.9
Virgin zinc	5.61	21.2	41.0	4.99	18.2	65.1
Refined lead	7.55	14.3	72.0	2.42	13.9	61.9
Tin	2.35‡	3.11	—	2.24‡	2 38	—
Zinc concentrates	—	13.5	96.0	—	11.0	75.93
Magnesium	0.51	0.62	—	0.46	0.30	—
Pig iron	194.0	153.0	556.0	184.0	139.0	506.0
Steel ingots and castings (including alloys)	328.0	—	1,097.0	307.0	—	1,296.0
Rubber: Reclaimed	0.66†	0.63†	2.57	0.43†	0.43†	2.6
Natural (including latex)	—	5.90†	37.4	—	4.02	44.7
Synthetic	—	0.06†	0.76	—	0.05†	1.37

* Distilling only. †Average of five weeks. ‡ September.

Kent Oil Refinery Scheme

WORK has now begun on the Anglo-Iranian oil refinery project in Kent, for which official approval was given in June last year.

The site is situated on a promontary formed by the confluence of the Thames and Medway river estuaries opposite Sheerness. When completed in two or three years, the annual output is estimated at two million tons. The cost of erecting a modern refinery is about £10 a ton, so that expenditure on this project is likely to be in the region of £20 million.

At the beginning of next year the first major plant will be brought into operation. This will be for crude oil distillation with sweetening plant for simple products. Lubricating oil manufacture will follow at the end of the year.

A catalytic cracker, together with the necessary treatment plants for improvement of projects is scheduled to be in operation early in 1953. Further equipment to improve quality and to manufacture special products will be added later.

Designed to operate on either Persian or Kuweit crude oils, or a mixture of both, the refinery will eventually employ some 1500 men.

INDUSTRIAL ACHIEVEMENTS

Growth of British Chemicals

THE chemical industry is perhaps the most basic of all Great Britain's industries. Its products are required in some form or another in every other industrial activity, including agriculture, and are essential for the comfort, well-being, and health of the community.

The Industry's Adaptability

A feature of the industry is its adaptability to new discoveries and constantly changing techniques. Among those which have had a profound influence in recent years are advancing knowledge of the mechanism of catalysts, the use of high pressures, the development of plastics, the use of X-rays, and the application of chemistry to biological problems.

The story of the spectacular growth of the British chemical industry is told by Mr. J. Davidson Pratt, director of the Association of British Chemical Manufacturers, in an article in *The Times' Survey of the British Industries Fair*, 1951, which records a century of British industrial achievement.

In 1949, when the Association of British Chemical Manufacturers prepared its comprehensive report on the hard core of the chemical industry, productive capacity was about £350 in value. At that time some 900 schemes of rehabilitation and expansion were in hand or contemplated over the period 1948-52 at a total cost estimated at about £200 million; many have, indeed, already begun to take shape. When these schemes are completed the annual productive values will rise to nearly £600 million, an increase of 70 per cent, while another 25,000 people will be employed.

A century of progress has seen an increasing demand for instrumentation which has been well met by the improvement in industrial design. Although the scientific instrument section at this year's BIF will be on a smaller scale than formerly, the combination of this display with the British Instrument Industries Exhibition in July will enable Festival visitors to see a more complete range of British instruments than ever before.

Other features of this year's BIF described in *The Times' Survey* include examples of laboratory porcelain ware made at Doulton; developments in industrial ceramics, especially acid-proof stoneware; modern applications in industry of glass technology; mechanical handling and petroleum equipment.

Special Act of Congress

THE United States Congress has been asked to help Mr. Richard F. Harvey who over 12 years ago developed a new hardening treatment which was first called "Step-Quenching" and later became known as "Martempering."

A U.S. patent application, Serial No. 320,998, filed on 27 February, 1940, covering this treatment, was eventually disallowed by the Patent Office. During 1940 a thesis on "Step-Quenching" was conducted at the Worcester Polytechnic Institute at Harvey's suggestion.

Congressional bills S. 3918 and HR. 9210 were recently introduced in the Senate and in the House to permit a patent to issue covering this treatment. This legislation is sponsored by Senator T. F. Green and Congressman J. E. Fogarty, both of Rhode Island.

The last previous legislation of this kind is thought to date back to 1878 when a special act of Congress was passed to permit the issue of a patent (Serial No. 205,942) to the heirs of W. A. Graham. Forty-one years earlier in 1837 Graham applied for a patent on the fire extinguisher which was denied by the Patent Office.

Harvey's patent application relates to work previous to his present employment as metallurgist at the Brown & Sharpe Mfg. Co., Providence, R.I.

Zinc Allocations Misunderstood

THE list of prohibited uses for zinc, copper and copper alloys issued at the Minister of Supply's press conference on Thursday, 28 December 1950 (and published in our last issue), has been misunderstood by sections of the press and industry. While bearing in mind that the list is provisional, industry should note that the intention is:—

(1) Galvanised articles are only prohibited if they appear under the headings about galvanising. For example, the ordinary household bucket does not appear under "galvanised hollow-ware" and its manufacture is not banned. Buckets do appear under "household appliances and domestic utensils"; this item relates to buckets made in zinc, copper or their alloys. Thus brass or copper buckets will be prohibited.

(2) For listed articles made for the most part of other materials, but containing a very small but indispensable amount of zinc, copper or alloy for a particular purpose, *e.g.*, gear wheels, the issue of a special exemption from the Order will be considered.

LABORATORY ACCIDENTS

"MANY believe that we are helpless against the apparently haphazard accidents, because they almost always occur unexpectedly. Nevertheless, the toll of accidents can be decreased. Even the most experienced of us should always be conscious that we, too, are not entirely immune to serious accidents, which may be the consequence of our own or another's ignorance, carelessness, blunders, or indifference."

Thus laying emphasis on the human frailties in many cases responsible for laboratory accidents, Mr. Rudolph Winderlich, in an article appearing in a recent issue of *The Journal of Chemical Education*" has this to say on the technical aspects:—

"Phenol, formaldehyde, and allyl mustard oil damage the skin; after long exposure, they destroy the skin tissue. Likewise, carbon bisulphide, paraffin, and olefins are not entirely harmless if they act on the skin continuously. In the hygienic supervision of all industries special care must be given to supersensitivity, which is not always an inborn characteristic but is often acquired as a result of frequently repeated exposure.

"Among the long-known heavy poisons, lead and carbon monoxide are the most frequent industrial health hazards. The list is being constantly lengthened and an additional toll of life and health is often taken before the effects are recognised and measures taken to guard against the careless handling of toxic or noxious materials.

Psychic Disturbances and Paralysis

"A striking example is ortho tricresyl phosphate $(C_6H_4CH_3)_3PO_4$, which has brought misery to many persons in Germany. This compound is employed in industry as a softener for plastic masses, as a solvent for gums and—mixed with acetone—as a polishing agent. During the period when fats were very scarce in Germany black marketeers sold this nice-looking clear oil to the hungry public for cooking purposes. Its ingestion results in psychic disturbances and temporary or permanent paralysis.

"Far-sighted governments have issued warnings and passed laws to protect the public against poisonous materials. These regulations are being constantly extended and improved. Households have been forbidden to store kerosene, benzene, benzine, turpentine, wood alcohol, hydrochloric acid, etc., in old beer or wine bottles, because people have often been poisoned through mistaking such liquids for the original contents of the bottles. Laws have been enacted for supervising the trade in foods and other necessities.

"It should be a strict requirement that every educational institution, from the lowest school to the university, must store its chemicals in such a manner that unauthorised persons have no access to heavy poisons, which should, in addition, be kept in tight containers. Care should be exercised in storing even "harmless" chemicals. For instance, alkalis and alkaline substances should not be put into bottles fitted with ground glass stoppers, since deliquescence and the resulting cementing of the stoppers often makes it impossible to open the bottle without shattering the glass. Sometimes accidents are caused by such frozen stoppers.

Violent Explosions Possible

"Thoughtlessness or carelessness may expose buildings and entire blocks to violent explosions if remainders of combustible volatile materials are dumped into drains and thus get into the sewers. If, for instance, waste oils from garages are run into the drainage system, they vaporise there, and by an unfortunate combination of circumstances the resulting explosive gaseous mixture may be touched off. More than one serious fire or explosion has resulted in chemical laboratories from the careless custom of throwing all sorts of residues into the same waste can, where unexpected reactions may then occur.

"Unpleasant surprises may result from perfectly harmless procedures if proper precautions are not observed. When a warm concentrated solution of potassium nitrite is allowed to flow slowly into a similar solution of ammonium chloride, nitrogen is evolved.

$$NH_4Cl + KNO_2 \quad KCl + N_2 + 2H_2O$$

The production of gas accelerates constantly because the reaction is exothermic, and with rising temperature the reaction rate increases exponentially. If the flask is not cooled quickly by immersing it in cold water the excessive gas pressure is liable to force the rubber stopper out of the flask or the latter may blow up.

"One of the worst explosions on record was the disaster at Oppau near Ludwigshafen on 21 May 1921. For some unknown reason, 4500 cwt. of ammonium sulphate-nitrate exploded, 559 people were

killed, 2053 buildings damaged, of which 1036 were completely demolished. It had been the usual practice to break up the solid masses of the salt by blasting, a procedure considered perfectly safe after numerous trials had never caused the material to detonate. Perhaps, in some strange manner, the salts had become segregated during storage, so that on the day of the disaster the explosive was acting chiefly on ammonium nitrate.

Never Completely Discovered

"As was the case at Oppau, the real causes of many explosions are never completely discovered. This applies, for example, to the explosion that occurs occasionally when potassium is determined by the perchlorate method. Max Popp, Director of the Agricultural Experiment Station at Oldenburg, experienced a case of this kind which fortunately did not injure anyone. During removal of the excess perchloric acid by fuming the platinum dish was suddenly torn into fragments which were hurled through the air. Perhaps dust particles of organic nature or an unforseen local superheating brought about the sudden decomposition. Organic impurities are certainly the most frequent causes of such explosions, whereas the explosions during the boiling-off of ether can usually be ascribed to peroxides, which are formed on prolonged storing in the light.

"The chlorates are much more dangerous than perchloric acid and the perchlorates. Numerous accidents have been due to potassium chlorate. Its victims have been not only students, but even teachers who were not sufficiently trained —a condition that prevails at least in Germany. This fact compels the requirement (unfortunately not yet fully appreciated) that chemical instruction be imparted only by persons who are thoroughly trained for this assignment, and that the young people should be made acquainted with the most essential chemical facts.

"The domain of possible chemical accidents is tremendous, and to avoid such unfortunate events it is not enough to rely on official regulations and directions; the primary factor is that the operator must do the proper thing. The possibility of accident is determined not solely by materials and apparatus, but predominantly by the actions of the person who uses them. Therefore the danger must be fought on the psychological front; people must be properly enlightened, instructed and, above all, trained to be careful."

Colour Tests for Clay

A SIMPLE, rapid colour test for identifying the clay composition in soil and rock has been developed in the United States. Scientists of the U.S. Bureau of Reclamation at Denver, Colorado, have devised staining techniques that help distinguish between clays that are destructive and those that are beneficial in agriculture and construction work.

The scientists prepare specimens for the staining process with a strong solution of hydrochloric acid. After heating, distilling, and filtering the clay they add a few drops of safraninely. Some clays turn blue, bluish purple, reddish purple, or violet. Others can be identified because they merely absorb the dye solution without change in colour.

The stained clay is put under a microscope and compared with specially prepared colour charts. The composition of the sample can be quickly identified.

Rapid field tests can be made by adding benezidine—a compound used in dry manufacture—directly to untreated soils and rocks, the Bureau states. Characteristic colour changes can usually be seen under a microscope within five minutes.

Dependability of the staining methods has been verified through a co-operative research programme in which 63 standard reference clays, collected from all parts of the United States, were studied by industrial and university research laboratories as well as by the Bureau.

When combined with other laboratory techniques, the staining tests permit analysis of all but the most complex types of clay. The tests also help in separating clay from non-clay materials. To some extent they show the amount of clay in soil specimens. The Bureau states that the tests are not infallible for extremely complex clay structural elements, but serve as valuable guides in identification and analysis.

To Build Steel Mill for Japan

The Nichia Steel Works, Ltd., of Kobe, Japan, has placed a $1 million order for rolling mill machinery and engineering services with the Lewis Foundry and Machine Division of Blaw-Knox Company, Pittsburgh. Production under the contract will form the nucleus of a modern continuous steel strip mill for the Japanese company. Lewis Foundry will supply seven of the eleven flat-rolling mills required for the new mill. The American company will also provide the design and complete engineering for the remaining mills, the edgers, and full complement of mill accessories and related equipment.

SODIUM CELLULOSE SULPHATE

THE sodium salt of cellulose acid sulphate is a substance of considerable interest to industries which make use of stabilisers, viscosity modifiers, film-forming compounds and thickening, suspending and binding agents. One of the most promising applications is in the manufacture of detergents, both soap and non-soapless types where the addition of the cellulose sulphate ensures that there is no re-deposion of dirt which has been removed from the fabric by the detergent.

Another interesting use now being found for this compound is in the production of water and emulsion paints where its inclusion enables the viscosity to be modified to suit manufacturing conditions.

Film Forming Properties

The film forming properties of cellulose sulphate are also of importance. In food manufacture, sodium cellulose sulphate acts as a stabilising agent for many made-up foods and as a thickening agents for various sauces and gravy preparations. It can also be used in textile processing as a thickening agent for printing pastes and as a finishing agent to give fabric a chintz-like finish.

In the paper industry use is being found for cellulose sulphate in the production of grease and oil-proof papers. Tests have shown that paper coated with low viscosity sodium cellulose sulphate is able to withstand oil penetration for more than two years and yet remain in excellent condition.

Another possible use in the paper field is as a sizing material to control the penetration of printing inks and to increase the strength of the paper. Unsupported films can also be made from sodium cellulose sulphate which are colourless, clear, strong, greaseproof and non-burning. It is suggested that such films may be used to prepare water soluble, individual packages for soap powders, bath salts, etc.

In the manufacture of cosmetics and pharmaceutical compounds sodium cellulose sulphate may be employed in the preparation of greaseless lotions, creams, pastes, salves and other medicinal ointments. Another interesting use which has been suggested is for the preparation of water soluble capsules for the administration of drugs. For ceramic slips and glazes this cellulose compound is of service as a thickening agent and it has also been suggested as a creaming agent for natural and synthetic latices.

In this new water-soluble cellulosic material the sulphate groups are attached to the cellulose chain by ester type linkages and there is approximately one sulphate group per three anhydroglucose units. Sodium cellulose sulphate as prepared by Tennessee Eastman Corporation, who have pioneered its development, is a light tan, dense, free-flowing powder soluble in both hot and cold water. Its 1 per cent aqueous solution has a *p*H of 6-8.

Like sodium carboxymethylcellulose, sodium cellulose sulphate is non-toxic and shows great stability in the presence of humidity or when stored for long periods under dry conditions. When treated with weak mineral and organic acids, it shows no marked deterioration and is not precipitated from aqueous solution, although there is a marked decrease in viscosity. Experiments have shown that the effects of acidification depend to a large degree on the type of acid rather than on the *p*H of the solution.

The addition of strong alkalis brings about an immediate drop in viscosity but the cellulose sulphate is highly resistant to hydrolysis. Compatability with inorganic salts is remarkably good; only a few salts cause precipitation at low concentrations, the most important being ammonium and zinconium salts.

Aqueous solutions of sodium cellulose sulphate are able to tolerate moderate quantities of water soluble organic solvents and they are compatible with gelatins and many water soluble gums as well as water soluble plasticisers, such as glycerin and sorbitol.

Chemical Resistant Paint

A HIGH duty gloss paint now being produced by Factron Products, Ltd., has been specially designed for use under conditions which seriously affect ordinary types of paint. Factron high duty gloss paint withstands direct attack by dilute acids and alkalis and is particularly recommended as a protective and decorative finish in humid, fume laden atmospheres and other arduous industrial conditions. The chemical resistant properties of this paint enable it to combat the attack of sea water and brine, and this factor combined with its considerable weathering ability when used for exterior work makes it highly suitable for use in coastal areas. During formulation, particular attention was paid to film strength, elasticity and adhesion.

CHEMICAL ENGINEERING

Opportunities in Specific Industries

THERE are about 1000 graduate and student members of the Institution of Chemical Engineers in industry and in colleges throughout the country and although the section now holds meetings in London, Chester and Newcastle, it is still difficult for many members to attend any of the regular activities of the institution. In order, therefore, that all members shall be able to maintain their professional interests, a special convention is to be held in London this year from 11 to 15 April.

While the main theme is general, each lecture will relate to conditions in a specific industry and will be given by a senior chemical engineer or other recognised authority. The series will show graduate members the way in which their work and problems reappear in modified forms and are variously solved in other industries.

For student members the convention should afford an invaluable means of assessing where their future interests might lie and the type of work which would be required of them. For all members there will be an opportunity for technical and personal discussions with chemical engineers from other industries and universities. It is hoped that firms will encourage industrial members to attend and that holding the convention in the Easter vacation will be convenient for students.

One of the main objects is to establish contact between young chemical engineers and leading members of the profession. To this end the main social event in the programme is the convention dinner and dance which will incorporate the annual dinner of the section and will be open to all members. The annual general meeting of the section will be held during the convention to enable out-of-town members to attend and, if they wish, to put forward in person their views upon the section's activities.

The programme of lectures is as follows:—

Wednesday 11 *April*—6 p.m. Introductory meeting; 8 p.m. The Gas Industry by R. F. Twist.

Thursday 12 *April*—9.30 a.m. The Iron and Steel Industry by A. N. Leckie; 11.15 a.m. The Non-Ferrous Metal Industry by Stanley Robson; 8 p.m. The Edible Oil and Allied Industries by A. J. C. Andersen.

Friday 13 *April*—9.30 a.m. The Low Temperature Industries by Mr. Ruhemann; 8 p.m. Scientific film display.

Saturday 14 *April*—9.30 a.m. Atomic Energy by A. S. White; The Plastic Industry by V. E. Yarsley.

In addition there will be a number of works visits including: The British Oxygen Co. Ltd., Wembley; B. X. Plastics, Ltd., Manningtree; G. A. Harvey & Co. (London), Ltd., Greenwich; J. Lyons & Co., Kensington; Shell Refining & Marketing Co., Ltd., Shellhaven; Tate & Lyle, Ltd., Plaistow Wharf; and Van den Berghs & Jurgens, Ltd., Purfleet.

The convention will be held at Nutford House, Brown Street, London, W.1. This is a hostel of London University and is situated within a few minutes' walk of Marble Arch. Membership will be limited to 150 people and residential accommodation is available for 50.

The Society of Chemical Industry

THE 70th annual general meeting of the Society of Chemical Industry will be held in London from 9-13 July, 1951, centred in the buildings of the Imperial College of Science and Technology, South Kensington.

London was chosen, partly because it seemed an appropriate setting for such an important occasion, and partly because of the Festival of Britain being held this year. Some 1300 scientists and their guests, from the provinces, the Empire and other countries of the world, have already expressed their wish to attend.

The organisation of the meeting, as is customary, is in the hands of the society's local section (in this case London), under the chairmanship of Dr. A. C. Monkhouse, of the Fuel Research Station, with Mr. E. L. Streatfield, FRIC, as the hon. secretary.

A full programme of lectures on the principal theme "Water in Industry" is being arranged. In addition, visits to factories and laboratories are being organised, and tours arranged to places of interest in and around London.

American BHC Plant

A new plant for the production of benzene hexachloride, which is at present in extremely short supply, is being rushed to completion at Natrium, West Virginia, by the Columbia Chemical Division of the Pittsburgh Plate Glass Company. Commonly called BHC, the organic chemical widely used in insecticides is produced through the reaction of chlorine and benzene.

A CENTURY OF BRITISH INDUSTRY

THE Trueman Wood Lecture was delivered before The Royal Society of Arts in London on Wednesday by Lord McGowan, honorary president of Imperial Chemical Industries, Ltd. After describing conditions 100 years ago and outlining important industrial and social changes since then, Lord McGowan said in part:—

Chemical products to-day play a vital part in nearly every industrial process, and chemical research for new products and processes is one of our best guarantees of industrial health and competitive efficiency. To retain our place in the industrial 'sun' this country must become more and more research-minded. The leadership in the organic chemical field, which we at first enjoyed and then lost to Germany, has been regained. It has been a long uphill battle, but we had already won it in 1939, when the great test came.

But technological progress is merely one aspect of the industrial revolution those years have seen. There has been, for instance, a series of radical changes in the organisation and structure of our industries, in their internal relations, and in the relationship of industry to the State.

The economic philosophy of a hundred years ago had its attractions. It was, for instance, delightfully simple; let every man do the best for himself. If his invention, or mere notion was a good one and his business prospered, so much the better for him and, presumably, for the country.

Too Complicated

Yet the writing was already on the wall for the bulk of these one-man enterprises. Life was becoming too complicated. The successive advances in technology were demanding an increasingly large scale of business operation and more and more production, and so the seeds of the big industrial corporations of to-day were laid.

There is much ill-considered talk against what is known as the profit motive. If companies are not allowed to make profits, what becomes of the poor shareholder? And what becomes of workers if management are not allowed to plough back some part of the profits made to ensure their being kept up-to-date, thus almost guaranteeing employment for workers?

Again, the factory owner of 1851 probably knew every man who worked for him. To-day, the gulf between the legal owner and the production worker is wide, but I think it is the bounden duty of executive directors and managing directors to get as close to their people as possible.

In 1851, Great Britain was known as "the forge of the world, the world's carrier, the world's banker, the world's workshop, the world's entrepôt." None of that is true any longer. The foundations of our leadership were beginning to crumble as far back as 1870, and we had lost it in all but name by 1914. But if success is to be measured by the results of our endeavours to wrest a better living for our people from the material world, then we have no reason to be ashamed of our performance.

Industrial Crown

Up to a point, therefore, British industry may be said to have been successful in the last hundred years, but in the course of them we have been forced to surrender the industrial crown. That crown is now worn by the United States of America.

There is no evidence that our people are less capable than America's, given equal conditions of work. The U.S.A. has, of course a much larger home market, but I do not believe that this is, or has been, a decisive advantage. It is also true that the U.S.A. is much more richly endowed with the raw materials that feed industry. That is an advantage which we cannot circumvent, but it does impose upon us the obligation to discover all the natural wealth of this old country.

We have a long way to go before we will have tapped all the hydro-electric power available in the Scottish Highlands, and it is only a few months ago that my Company's engineer reported the discovery in North Yorkshire of at least 200,000,000 tons of potash—a strategic material that has had to be imported at great cost up to this time. So far as natural resources are concerned, our gravest disadvantage to-day is that we are not raising our coal, which we still have in abundance, either cheaply enough or in sufficient quantity. We cannot look to atomic energy to help out our power resources for a long time to come.

The two world wars have dealt heavy blows at our economy, whereas their effects on the U.S.A. have been much the reverse. We have come through very bad times, and even when full allowance is made for American and Canadian assistance, there is still much of merit in our recovery.

We have, however, one fundamental weakness which we can, and must, overcome. It is epitomised in the story of William Henry Perkin, the young chemist,

whose discovery of mauveine laid the foundations of the dyestuffs industry.

It is now ancient history, as they say, that we failed to exploit Perkin's discovery, but left it to others. This sort of thing has happened all too often. We are second to none for richness of invention, but we frequently fail in the follow-up—that is to say, in visualising the potential of the fruits of research and giving them practical application in industry.

Future Guidance

One purpose of examining the history of what has happened in the past is to try to draw from it guidance for the future. I would suggest, therefore, that we must give serious consideration to the steps required to ensure, as a matter of national policy, the practical application of scientific knowledge to industry. I believe that there are two essential parts to such a policy.

First, I would like to refer to the argument developed by my colleague, Sir Ewart Smith, in a paper which he read last September to the British Association. He spotlighted the essential difference between the industrial forces of Great Britain and the United States—that is, our numerical deficiency in applied scientists. This is the trained manpower without which new knowledge cannot be applied to productive purposes.

Sir Ewart pointed out that American universities were producing more technologists than pure scientists, whereas in this country in 1949 degrees in Applied Science represented only some 12 per cent of the total in all faculties.

If we are to increase the number of Applied Science graduates it will involve changes, he said, not only in the universities, but also in the schools. Boys in their formative years will have to be steered towards, and not told to shy away from, a desire to acquire knowledge for practical ends. The old idea that a career in Applied Science in industry is inferior in status to other professions must be killed stone dead, if we are to meet the challenge of the times.

Moreover, the increase in technological skill should not be confined simply to graduates. What is required in an upgrading of technical training at all levels.

If we accept an increase in overall national productivity of not less than 5 per cent per annum as our objective, then a similar rate of increase is required in the supply of graduates and others with the necessary applied scientific training.

This proposal involves a radical shift in the balance of our educational system. It means, for example, that technical colleges would have to be upgraded to share the burden with the universities. But if it is achieved, and the larger number of trained men and women are forthcoming, we shall still have to see that they are absorbed into industry and employed to the best purpose.

In the meantime, I think we will have to make a strong and well-reasoned appeal to management to absorb these new men of industry as fast as the supply allows, so that more and more young men will be encouraged to follow the same path. Once this stage is reached, we shall be a far better position to begin redressing the balance between American productivity and our own. Moreover, we will then be able to regain the initiative in setting up new methods and new lines of production. Only in this way can we hope to keep ahead of the younger industrial nations and have new products to offer in place of those which tend to decline in importance in international trade.

British Genius

The world owes radar in large measure to Sir Watson Watt, and the discovery and development of penicillin to Sir Alexander Fleming and Sir Howard Florey. What other nation can to-day point to three men of comparable genius to these? Not one! There are the living proof that with the passage of the years we have not lost the qualities necessary for *permanent* leadership in many fields. Surely we must be proud of what these men have accomplished, and I finish on this note, that however bleak the outlook is to-day, caused by the parlous condition of international affairs, we in this country have no need to despair. Our traditions have carried us through many crises successfully for hundreds of years, and will do so again—it is the spirit of the people that will determine our future—but we cannot be content only with our past traditions; we must build new ones for the future. Let us recapture the Dunkirk and Alamein spirit, which brought us through momentous phases in the last War; let us face the future with the confidence, courage, and optimism, so characteristic of our race, which have served us so well in the past.

New Zealand Coal Discovery

According to the New Zealand Mines Department, systematic surveys on the Stockholm plateau on the West coast of South Island have indicated the presence of a large coal deposit less than 100 ft. below ground. The deposits are said to total 15 million tons.

TECHNICAL EDUCATION & CRAFTSMANSHIP

Work of the City and Guilds of London Institute

THE importance of maintaining a high standard of technical education and craftsmanship if this country hoped to survive in the present competitive age, was emphasised by Sir Frederick Handley Page, C.B.E., chairman of the council and executive committee of the City and Guilds of London Institute at a dinner given last week, in Grocers' Hall, to the Masters and clerks of the City Livery Companies.

It seemed particularly appropriate that they should meet and discuss its work in this year of the Festival of Britain when the centenary would be celebrated of the Great Exhibition of 1851.

At the time of the Great Exhibition there was little provision for technical education other than apprenticeship training, and with increasing competition from abroad it was evident that a great improvement had to be made in our technical education if this country was to maintain its place in world industry and trade.

It was remarkable how the Corporation and Livery Companies of the City of London stepped into the breach and founded in 1878 the City and Guilds of London Institute for the advancement of technical education. And so there were set up, the Department of Technology to hold examinations and award certificates in a wide variety of technical subjects, the Art School in 1879, the Finsbury Technical College in 1881, and the Central Technical College in 1885.

170 Different Subjects

Well over one million students had sat for the institute's examinations. Numbers had increased from 47,824 in 1947 to 73,500 in 1950. A wide variety of subjects was dealt with. In the department of technology some 170 different subjects were dealt with in examinations in chemistry, metallurgy and telecommunications, mechanical engineering, in building subjects, in artistic crafts and printing trade subjects, needlecraft, cookery, food technology and housecraft.

The strength and prestige of the City and Guilds of London Institute was, in fact, largely derived from its independence of authority inherited from the Guilds—themselves fearless and independent in the task of serving industry and the nation through technical training.

Proposing the toast of "Technological Education," Sir Ewart Smith, director of I.C.I., Ltd., and member of the Advisory Council on Scientific Policy, said:

"We live in a technical world, and though we may at times regret its present condition, and still more its trends, we cannot escape it."

"In this world all things are relative, and for us to hold our position in the world, we must not only make progress in comparison with our past achievements, but we must also maintain our position relative to the other nations of the world. We, of all peoples, with our crowded island and dependence on foreign trade, must keep in the van of the industrial race or we are lost. The main measure of our success or failure is in our industrial production as a whole."

Britain Led the World

"In the 19th century, we led the world in all branches of industry and commerce, as well as in science and in the arts. Today, we are still in the lead in the field of pure science, that is in the production of basic technical knowledge, but except in isolated cases we cannot say the same of the whole industrial field."

"How does it come about that, having the basic knowledge, and being first away to a flying start, we should let others beat us to the post so that they frequently turn our knowledge to their account before we can do so? Have we lost the creative ability which showed itself in the Caxtons, the Wrens, the Stephensons, the Watts, the Brunels of former years? To this the answer is certainly No, for Parsons, Appleton and Whittle and countless others are there to prove the contrary."

"Equally, do not let us blame our lack of resources, for we still have the coal (if we care to get it), and the raw materials of the world are there for us to draw on, as in the past, if we have the competitive efficiency to enable us to pay for them. By competitive efficiency I mean the average annual output of each one of us in comparison with our opposite numbers in other countries."

"There is no doubt, a slight but definite slackening in our industrial race. Time and the war, together with our national tendency have no doubt played their share in this."

"I believe, however, that there is another major and more definite cause, and one that is entirely in our own control—I refer to the education of a sufficient

number of our people in technology, or as I would prefer to call it, in applied science. Unless we have a sufficiency of such education, we are not able to apply fully and promptly in the service of man the never ending advances of science."

"The U.S.A. is now turning out approximately 15 times as many university trained engineers as we do in this country —that is five to one per head of the population. Of even greater significance is the fact that the trends of higher education have shown a marked and definite rate of increase, whereas we have been static for long periods."

"With the advent of mechanisation and automatic operation of plant and equipment, the emphasis swings to the need for men to work on the research, design and development functions relative to the personnel with little or no technical training required for manual operation. We must, therefore, face the need for training a growing proportion of our population in technology of all kinds."

Planning of the Right Kind

"If we could have had a new C.G.I., and particularly a new City and Guilds College every ten years from 1875 onwards, how different our present position would have been. There would not only have been more impetus to the direct application of scientific knowledge in industry, but we should have injected more of the critical and analytical approach into all walks of our national life. I believe firmly in planning of the right kind, but for it to be effective it must be broadly based on technical knowledge and a firm grasp of technical possibilities, as well as on a sound background of economics and business."

"Before I finish may I say a word on the type of higher technological education which I believe to be desirable. First in importance I put training in fundamentals so that students are taught to think for themselves, and in this way provide the essential leaders on whom all else depends."

"Secondly, I put the need for technological education to be broad in its basis and include such subjects as English, history and the elements of economics. I should like to be certain that the future leaders in the technical field not only have a good knowledge of applied science, but also to ensure that they have a proper appreciation of the Humanities."

"Equally, I believe that those trained for work in other walks of life should have a proper general knowledge of science and of the technological approach. Not least does this apply to those who govern us."

RAW MATERIAL SHORTAGES

New Organisation to be Set Up

COMMODITY groups to consider the problems of scarce materials and recommend action to deal with them are to be established by Great Britain, U.S.A., France and other Western consumers.

A statement issued simultaneously in London, Paris and Washington recently said that discussions had been going on for some weeks as to ways and means of bringing about co-operation among the countries of the free world to increase the production and availability of materials in short supply and to assure their most effective use.

Events of the last few weeks had made it clear that commodity problems could not be dealt with on a regional basis, but must take into account the needs and interests of the free world.

The three Governments therefore proposed the setting up of commodity groups to ensure fair distribution and utilisation. Commodities, which required early action and were likely to come within the scope of the groups, were: sulphur, copper, zinc, lead, nickel, cobalt, magnesium, chrome, tin, rubber, cotton, wool, and paper.

A temporary central organisation is also to be set up in Washington to direct and co-ordinate the work of the groups. All 18 Marshall aid countries were reported to have given the scheme their approval.

The extent to which producer countries would agree to promote allocation schemes or other measures which might influence commodity prices, was one of the main problems. Another difficulty would be the fixing of distribution quotas among consumer countries.

Welcoming the proposals, which he said, marked an important step forward, the Chancellor of the Exchequer, Mr. Hugh Gaitskell, stressed the urgency of the problem. There was, however, still a long way to go, and if the task was to be successfully carried out the new organisation must be given whole-hearted support.

Ban on Metals Postponed

Operation of the Order restricting the use of non-ferrous metals has been postponed for one month from 1 February to 1 March. This decision by the Minister of Supply followed representations from several industries affected. Another concession announced was to allow firms to continue to use up to 1 July stocks of semi-fabricated metal and partly processed articles in their possession on 1 March.

PURE AND APPLIED SCIENCE

A *Philosophical Survey*

"THE Relation between Pure and Applied Science," was the subject of the Jubilee Memorial Lecture given by Professor H. R. Kruyt to a meeting of the London section of the Society of Chemical Industry, held in the rooms of the Royal Society, Burlington House, London, on Monday.

Mr. Stanley Robson, president of the society, who introduced the professor, said that these lectures had been started in 1931 in celebration of the jubilee of the SCI. One of the conditions was that each lecture should be given twice—once in London, and once outside the capital—so that other branches of the society might benefit from hearing the distinguished speakers in person, instead of only being able to read their papers.

It gave him great pleasure to be able to introduce Dr. Kruyt of Utrecht University, president of the International Union of Pure and Applied Chemistry, past president of the Chemical Council of the Netherlands and past president of the International Council of Scientific Unions.

Misunderstanding of the relationship between pure and applied science was all too frequent and the terms were used with insufficient discrimination. Before trying to distinguish pure from applied it was necessary, said Professor Kruyt, to try and realise what was meant by science. We live in a world of enigmas, and science was an attempt through thought and analysis to bring complicated phenomena to clarity and to understand reality.

This again led to complications, for it was often hard to inter-relate the various branches of science. It was all too easy to say: "Biologically speaking . . . ," "from a chemical point of view . . . ," "as a physicist it would seem . . . ," and so on, but the problem was to raise them all to a higher unity.

Circle of Understanding

By a series of diagrams the professor showed some of the phases through which understanding was achieved. In the first case the circle passed through method, observation, experiment and coherence to application. In the second, the correct sequence would be from analysis, through classification and logical coherence to application, but sometimes the application followed directly from classification.

As an illustration of a theoretical device by which a chemical reaction might be carried out in a series of reversible operations, Dr. Kruyt quoted van't Hoff's work on the equilibria in gases.

Other examples of the triumph of applied chemistry were the use of fertilisers in agricultural science for the public welfare and the synthetic dyestuffs developed from coal tar.

Pure science might therefore really be defined as an endeavour to understand and while doing this, inquiries might lead far away from the original idea to fresh problems and new knowledge.

One Aim in View

Applied science, on the other hand, started off with a chosen target in view, and all work and investigation was directed to attaining that goal. The artificial synthetic fibre was an example where all the research had been carried out with the eventual aim of producing a pure synthetic fibre for commercial application.

Applied science was a scholarly business but should not be confused with the application of science, which was a matter of doing, not understanding.

Finally, the professor emphasised the importance of the well equipped university. It was essential to have a supply of young men educated in an atmosphere of creative research. The universities should be the cradle of pure science.

Some people advocated the greater employment of prominent scientists directly in industrial work. It was not wise, however, to "put a race horse in a wagon," and he felt this was not the right policy in the long run.

Dr. L. H. Lampitt, who proposed a vote of thanks to Dr. Kruyt for "his scholarly, wise, and philosophical survey," said he would like to express his appreciation of him both as a man and as a lecturer.

As a man, he had known him since 1932. Dr. Kruyt had worked with wholehearted enthusiasm for international science. When after the war attempts were made to reinfuse some life into the International Union of Pure and Applied Chemistry, Dr. Kruyt was the first to come forward. In honouring him, one was honouring the spirit of international chemistry.

As a lecturer he had shown that he was well worthy to speak in the rooms of the Royal Society whose Fellows were predominently influenced by the philosophy of science, and was a true representative of the cultured life for which Western Europe had been noted through the ages.

The Chemist's Bookshelf

Selemium. Sam F. Trelease and Orville A. Beath. 1949, New York: Published by the authors. Pp. viii + 292. Figs. 61.

This book is subtitled "Its geological occurrence and its biological effects in relation to botany, chemistry, agriculture, nutrition and medicine." Selenium poisoning, which of recent years has brought this element into prominence, is a topic of considerably greater importance for America than for Britain, and it is natural that the present discussion of the element should be written primarily from the standpoint of the American reader, and should contain little reference to the problem as it may occur outside the United States. It is written jointly by a botanist and a chemist, both of whom have had extensive experience of the investigations prompted by the natural occurrence of the element. They have been able to extend the discussion well outside their immediate field, to consider the geological, animal and human aspects of selenium.

The sections of the book most likely to interest chemists are those dealing with the natural occurrence and distribution of selenium, the forms in which the element is taken up and stored biologically, and its chemistry, including methods of estimation and uses. Some will also welcome the discussion of the element in relation to public health.

Some readers will be particularly impressed by the uncertainty of the methods of analysis. It is of considerable importance that it should be possible to ascertain whether the element is present in inorganic or organic form. However, it seems clear that the methods used to make the distinction are far from definitive. Little is known, either, regarding the organic seleniferous compounds which may be involved.—C.L.W.

Lehrbuch Der Allgemeinen Metallkunde. By Dr. Georg Masing and Dr. Kurt Lücke. Springer Verlag, Berlin, Göttingen, Heidelberg. 1950. Pp. XV + 620. Dm. 56. Bound Dm. 59.60.

This is the recognised outstanding book concerning general metallurgy, following and supplementing the well known textbook by G. Tammann, which was published in 1932. The enormous development of metal physics during the last decade and the infiltration of physical aspects and methods into the most fields of metallurgy justifies this comprehensive treatise on the whole subject of general metallurgy, defined as the doctrine of metals in their elementary metallic state and of their mutual relations.

The book is divided into twelve chapters. It begins from a historical background with definition and fundamental facts of metallurgy and its general foundations. The following specialised informative material includes heterogenic statics, the atomistic formation of metallic crystals, diffusion and the various physical properties of metals. The chemical reactions of metals with non-metal substances are dealt with in detail. The book is copiously illustrated, carrying 495 figures and sketches pertinent to text, and includes many tables incorporating essential data rather unavailable in any other single volume. All material is closely indexed in a name and subject index and a comprehensive bibliography is appended. The book will thus serve as a dependable textbook for use by all who are interested in modern metallurgy, students as well as chemists and technicians and it will help to answer all questions relative to the matter of metallurgy. —F.N.

Modern Soap Industry

In The Chemist's Bookshelf of last week the name of the publishers of "The Modern Soap and Detergent Industry" (3rd Edition) was inadvertently omitted. The publishers are The Technical Press, Ltd., Gloucester Road, Kingston Hill, Surrey. The book, which was written by G. Martin, was revised by E. I. Cooke.

Technical Publications

A METHOD for the analysis of mixtures of inorganic sulphur compounds is described in the current issue of the *New Zealand Journal of Science and Technology* (1949, *30*, 6). By means of the new procedure, according to J. L. Mangan, the separation and estimation, in mixtures, of dithionate, polythionate, sulphate, thiosulphate, sulphite and sulphide may be readily achieved. The method depends on the properties of the lead salts. The solubilities of lead thiosulphate, sulphate and sulphite have been determined in solutions of ammonium acetate at concentrations of from 0.5-5 M. The effects of change in pH and in temperature have also been observed.

* * *

EFFICIENT, economical screening plays an important part in many chemical processes. Concentric action vibrating screens for medium and heavy duty service, accurate sizing, thorough rinsing and rapid dewatering of a wide range of materials—from ashes to zinc ore—are illustrated and described in a booklet (No. 2354) published by the Link-Belt Company of Chicago. The C.A. vibrator mechanism imparts a smooth, positive, circular motion to all screening surfaces.

* * *

BALANCING a pencil to measure the efficiency of rubber engine-mountings was a test recently applied to a new 18-ton shunting locomotive. A description of the procedure is given in the current issue of "Torque" (1951, 1, 7). An ordinary pencil was balanced on the side running plate of the locomotive while stationary. At all engine speeds the pencil remained upright. "Torque" is the development journal of Silentbloc, Ltd., and the Andre Rubber Co., Ltd.

* * *

A HIGH degree of mechanisation in the handling of materials is one of the fundamental reasons for the greater rate of production in the U.S.A. than in Great Britain. Ways in which aluminium can help to improve handling devices are specially featured with text and illustrations in "The Aluminium Courier" (No. 13) published by the Aluminium Development Association. V. F. Henley gives an account of mass production anodising.

* * *

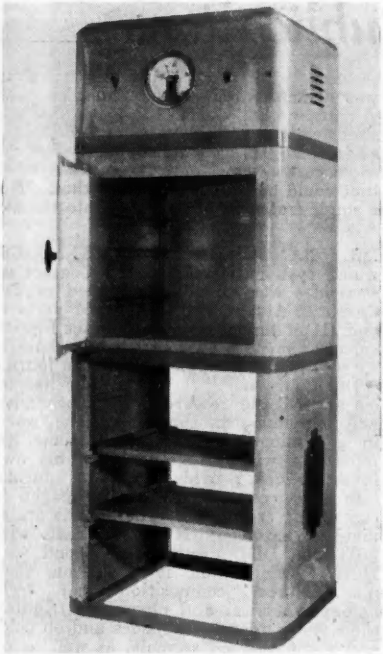
THE BANG in dynamite can now be removed—according to an article appearing in the December issue of the *C.I.L. Oval* (1950, *19*, 6). Under the heading of "Quiet, Please!" the article explains how the new "split second" blasting technique was demonstrated at the Canadian town of Sherbrooke, Quebec, last winter; 1570 sticks of dynamite were exploded in a single blast and crumbled more than 800 cubic yards of rock into fragments, yet all that could be heard was a dull thud. Not a single fragment of rock flew into the air.

* * *

DR. RANDOLPH RIEMSCHNEIDER, whose systematic research on Contact insecticides was already mentioned in THE CHEMICAL AGE recently published parts II and III of Information on Contact Insecticides. They are part of a comprehensive survey, being a supplement of the journal "Die Pharmazie." The author has incorporated the researches of biochemists and entomologists throughout the world in a bibliography comprising some 350 references which, together with his own investigations, provide a mass of information of direct concern to all engaged in controlling crop pests. These parts are so divided that the first section deals with DDT and DDD groups, the second with HCH. Information is given on their manufactures, composition and technology, chemical and physical attributes, their effect upon arthropodes and on cold- and warm-blooded animals, as well as on analyses. Mention is made of those compounds which have been developed in Germany during recent years. The author would greatly appreciate if English translations of both parts were made available to English readers. Two recent publications of the author in the Zeitschrift für Naturforschung, Tübingen, concern the insecticides Hexachlorcyclohexan II and III, isolated from Cyclohexan by chlorination.

* * *

FLAMES: their structure and radiation, is the subject of an article appearing in the current issue of "Endeavour" (1951, X, 37). The article, by A. G. Gaydon, describes the different types of flame and mentions some of the special instruments used in the study of flame phenomena. Reference is made to the uncertainty of chemical knowledge of flame, indicating that existing theories cannot account for the presence of such radicals as CH, HCO and C_2. The discussion of combustion is illustrated by some fine photographs in colour, which, despite the author's too modest claim that "perfect reproduction has not been achieved" are nevertheless very beautiful.



Modern Drying Oven

DRYING processes requiring relatively low temperatures, such as lacquering, curing and preheating, may be efficiently carried out by the use of the Funditor drying oven.

The oven is electrically operated and is fitted with an automatic temperature control, the standard range being 140° to 500° F. and 60° to 260°C. although other special ranges are also available. The control has a temperature differential of ±2°C. The heating elements are of nickel chrome and there is a forced air circulation system with adjustable baffle. If required, however, the oven can be supplied without forced air circulation. Where humidity is needed for satisfactory processing the oven can be equipped with a humidity control.

For processes needing more time than the normal working day the oven is fitted with an automatic time switch, to cut off at any given time. Similarly, an automatic timing device can be set to switch on at any pre-determined time during 24 hours. The standard models are fitted with removable shelves but the number can be varied according to particular needs. The ovens are supplied in three sizes. All are mounted on a steel base 34 in. high, which is fitted with shelves.

The oven, which is illustrated in the photograph, is made by Funditor, Ltd., London.

A BOOKLET of 32 pages on the art of forging copper and copper-base alloys by to-day's methods and on to-day's scale has been published by the Copper & Brass Research Association, New York. Forging has become a tool of mass production and the demands for its products during World War II has awakened the brass forging industry to new opportunities. Much research and development work has been devoted to the art since, so that not only has the field of application for brass and bronze forgings grown by leaps and bounds, but constant improvements are made in forging technique and in the number and quality of the alloys suitable for forging.

The booklet deals chiefly with the kind of forging performed in presses for closed-die or impression-die work. It describes the manner in which such forgings generally are produced and clearly defines the various types encountered; it points the way to the ever growing possibilities of use of this rather modern method of fabrication.

A SURVEY of the work carried out by Metropolitan-Vickers Electrical Co., Ltd., is contained in the January, 1951, issue of the Metropolitan-Vickers Gazette (*23*, 383). Several high accuracy creep-testing machines capable of detecting strains down to 10^{-6} at temperatures of up to 900° C., have been delivered. Field experience has been gained on applications of the general purpose mass spectrometers to the analysis of hydrocarbon compounds. Work has also proceeded on the development of facilities for the manufacture of X-ray equipment.

* * *

NICKEL vessels, in which phenolic resins are concentrated and distilled, are illustrated in the latest issue of "Wiggin Nickel Alloys," published by Henry Wiggin & Co., of Birmingham. Other uses of nickel alloys described in the booklet include those of Monel heating coils in tanning pits and of Monel gaskets for steam pipe lines.

HOME

New Branch Office

A new branch office has been opened by Air Control Installations, Ltd., at 70 Mosley Street, Manchester 2. The telephone numbers are CENtral 0679 and 0670.

Liverpool Factory Purchased

A large, modern factory at Hunt's Cross, Liverpool, has been bought by Yardley & Co., Ltd., the London perfumery and soap manufacturers. The factory was recently enlarged and re-equipped and has a total production space of 38,000 ft.

Tin Price Lower

Following a sudden strengthening of the tin market in London on 9 January, when spot quotation finished at £1,212 10s. per ton and three months at £1,207 10s., prices were erratic. On 12 January there was another fall and on 16 January the price again weakened. Closing price of spot was £1,202 10s. and three months £1,192 10s.

Cortisone Imports—But Only As Gifts

The import of cortisone from America is permissible but only in the form of gifts. A recent statement by the Board of Trade said that "the Ministry of Health points out that imports of cortisone are still on trial as a remedy. Should their sources of supply be unable to provide enough cortisone to complete the patient's treatment he cannot count upon supplies from this country."

I.C.I. Pay Increase

I.C.I. (Alkali), Ltd., Northwich, have announced an increase of 3d. an hour for all adult workers except those in the building trade. The increase is effective from 1 January. The announcement followed negotiations between the engineers' union and the firm. It is estimated that the increase, which will amount to approximately 11s. a week for each man, will affect about 6000 employees.

French Science Books

A special exhibition of 400 books and some periodicals in different branches of science and technology produced in France during the last few years is being held at the Science Library, Imperial Institute Road, South Kensington. The display, arranged by the Cultural Relations Department of the French Foreign Office, includes books for the general reader as well as the research scientist. The exhibition will later tour the principal cities.

Barium Salts Price Increases

The following price changes operating from 1 January were announced last week by Laporte Chemicals, Ltd. Barium carbonate (precipitated) in 2-ton lots increased by £1 to £28 5s. per ton; 4-ton lots £28 per ton. Barium chloride fine crystals increased by £3 to £38 10s. per ton in 2-ton lots; 4-ton lots £38 per ton.

Changes of Address

The consulting engineers C. Mackechnie Jarvis & Partners have moved from Craven Road, London, W.2, to 26 Victoria Street, Westminster, London, S.W.1. Their new telephone number is Abbey 4841. The laboratory of Patons & Baldwins, Ltd., has been removed from Halifax to Darlington, County Durham. The telephone number is Darlington 3504.

Fuel Shortage Threatens Foundries

Some foundries in the Black Country and the Birmingham area may soon have to close down because of the non-delivery of coke. Stocks have fallen and in some cases are only sufficient for a few days. The present position is attributed to delay in despatch, accentuated by loads being held up *en route* for unusually long periods.

Dearer Rayon

Price increases affecting all types of rayon yarn were announced by the Rayon and Synthetic Fibres Producers' Committee on 15 January. Increases for continuous filament yarn vary between 4½d. and 10½d. per lb. and the price of rayon staple has been raised by 4d. a lb. The increased charges are attributed to the recent 15 per cent cut in production brought about by the restriction of supplies of sulphuric acid, and the higher cost of basic raw materials.

Fuel Supply to Industry

A statement issued by Sir Ernest Smith, chairman of the Industrial Coal Consumers Council, on 11 January, forecast that the present shortage of fuel would last for some years and emphasised that there was no justification for minimising the existing fuel crisis. The statement further indicated that the council had decided to represent to the Minister of Fuel that the industry would welcome guidance on the minimum amount of fuel that firms might expect to receive in all but the very worst weather and transport conditions.

OVERSEAS

West German Zinc Works to Expand

The Stolberger Zinc A.-G., of Maubach, in Western Germany, is to receive 2.4 million marks from ECA counterpart funds, to be used in expanding zinc output. It is hoped that production of zinc will be increased from the present total of 400 tons per day to about 3000 tons per day.

Kashmir to Grow Pyrethrum

Large-scale cultivation of pyrethrum and of other drugs has been undertaken by the Government of Kashmir. In all, some 2000 acres have been selected for this purpose in different parts of the State and a special sector, called the Pyrethrum and Drug Cultivation Division, has been established within the Forestry Department.

U.S. Sulphur Production

Output of native sulphur in the U.S.A. in October, 1950, totalled 440,262 long tons according to reports filed by producers with the U.S. Bureau of Mines. This was an increase of some 48,000 tons over the same month of the previous year, but about 26,000 tons less than the production for September, 1950. Producers stocks at the end of October, 1950 were reported to be 2,822,913 tons or 30,775 tons less than at the end of September. Production for the first 10 months of 1950 was 4,332,625 long tons as against 3,951,795 long tons in the previous year.

New Anglo-Swedish Cellophane Venture

The Swedish Co-operative Union (Kooperativa Förbundet) has concluded an agreement with British Cellophane, Ltd., envisaging joint manufacture of cellophane in Sweden. A company has been established to take over the A.B. Nordisk Silkecellulosa in Norrköping, Sweden, and increase its cellophane output.

U.S.-German Process Agreement

The Chemical Plants Division of the Blaw-Knox Company, Pittsburgh, Pa., has completed arrangements with the Linde Iismaschinen Company of Germany, authorising it to design and construct complete plants employing low temperature processes for the production of tonnage oxygen. Among other processes made available by the agreement are the low temperature separation of industrial gas mixtures, such as coke oven gas, and the separation from the air of rare gases, such as argon.

More Oil in Eastern France?

A boring in the Belleville area, Department Meuse, France, originally started to drill for iron-ore, is being continued in the hope of discovering oil.

French Potassium Salts

It is estimated that this year's total of raw potassium salts mined will probably exceed 5.5 million tons, as compared with 5.3 million tons in 1949. About 870,000 tons of manufactured potassium products have been disposed of this year. Just over half of this total has gone abroad, while the balance has gone to Metropolitan France and to the overseas territories. Losses sustained in the little-remunerative home market have been outweighed by favourable results from exports. Net profit is anticipated to amount to about 700 million francs; practically the same figure as in 1949.

Oil Found in French Morocco

The Soc. Cherifienne des Petroles, which has already opened up the oil occurrences of Qued Beth in French Morocco, has made another find in the Rharb area at a depth of about 1,500 metres. Initial output amounted to about 25 cubic metres per day.

German Chemicals for Iceland

An agreement concluded between the Federal German Republic and Iceland, valid from 15 March until the end of 1951, envisages the supply of chemicals and allied products, including dyestuffs and auxiliary products for the textile industries, to the value of U.S. $160,000.

New African Cement Works

A new enterprise, Ciments Portland de Bizerte, is to be established in Tunisia with an initial share capital of 300 million francs. The Soc. Coloniale des Ciments de Marseille is to participate in the new venture, which intends to erect a cement factory with an annual capacity of 120,000 tons.

Rhodesian Ferro-Chrome Project

Work on the large-scale ferro-chrome works of Rhodesian Alloys, Ltd., is now beyond the planning stage. The bulk of the equipment needed is now on order, mainly in this country, but some essential parts are being bought in France. Clearing of the site has already started and parts for the factory buildings are expected to arrive in April of this year and it is hoped to begin production in the summer of 1952.

PERSONAL

MR. A. H. KAYE, manager of the silicate plant of Jos. Crosfield & Sons, Ltd., has been appointed to take charge of the company's carbon black plant at Ellesmere Port.

SIR CYRIL HINSHELWOOD, F.R.S., SIR CLAUDE GIBB, F.R.S., and COLONEL H. C. SMITH have been appointed by the Minister of Fuel and Power to be members of the Scientific Advisory Council. DR. E. S. GRUMELL and DR. H. HOLLINGS have retired from the council.

MR. RAYMOND C. GAUGLER has been elected president of the American Cyanamid Company in succession to the late Mr. W. B. Bell, who died on 20 December, 1950. Mr. Gaugler has been with the Cyanamid organisation since 1917. He is a director of several of Cyanamid's principal subsidiaries and also of a number of associated companies.

ADOLPH MONSAROFF was recently appointed a vice-president of Monsanto (Canada), Ltd. A chemical engineering graduate of the University of Toronto, Mr. Monsaroff joined the Toronto operations of Mallinckrodt Chemical Works in 1934. Since 1945 he has been plant manager of Monsanto's Montreal operations.

DR. H. O. WANSBROUGH-JONES has been appointed Principal Director of Scientific Research (Defence) at the Ministry of Supply. In order to take up this appointment Dr. Wansbrough-Jones has relinquished his post of Scientific Adviser to the Army Council. Dr. Wansbrough-Jones is 42. At the outbreak of war he was Senior Tutor at Trinity Hall, Cambridge. He rose from second lieutenant to brigadier in the Royal Engineers during the war. He became Director of Special Weapons and vehicles at the War Office in 1945, and Scientific Adviser to the Army Council in 1946. He has carried out considerable scientific research in Cambridge and in Germany, and has sat on Government research committees. He has been a Fellow of Trinity Hall, Cambridge, since 1930.

MR. WILLIAM FORREST, "Marsilla," Main Road, Elderslie, Renfrewshire, of William Forrest & Son, Ltd., Paisley chemical manufacturers, left £22,462.

The Mond Nickel Fellowships Committee has announced the following awards for 1950:—

MR. D. ALEXANDER (University of Otago, New Zealand), to study industrial technique and the application of research to metallurgical control in Great Britain, with special reference to tinning, plating, enamelling and other surface finishing processes. MR. F. R. H. ALLON (John I. Thornycroft & Co., Ltd.), programme not yet decided. MR. K. W. J. BOWEN (Cambridge University) to study factors affecting the selection of materials for the construction of chemical and petroleum plant in the U.S.A. and Canada, with particular reference to the influence of research in this field. MR. M. G. GEMMILL (United Steel Companies, Ltd.) to study in Britain, U.S.A. and Canada, the manufacture, testing and application of steels for high temperature service. MR. W. B. HALL (Nchanga Consolidated Copper Mines, Ltd., Northern Rhodesia) to study American and Canadian plant practice in the hydrometallurgy and electro-winning of base metals, with special reference to copper and its associate metals and to make a general study of mechanisation and plant management in ore dressing and leaching plants.

The Mond Nickel Fellowships Committee will later invite applications for awards for 1951. Full particulars of the Fellowships can be obtained from the Secretary, Mond Nickel Fellowships Committee, 4 Grosvenor Gardens, London, S.W.1.

OBITUARY

The death has taken place of MR. FRED BRINDLE, of Sharples Avenue, Astley Bridge, Bolton, a lecturer in pharmacy at Manchester University. Mr. Brindle was 59.

It is with great regret that we have to announce the death on 2 January of MR. K. S. MCMANUS, F.R.I.C. For many years Mr. McManus worked in the Powell Duffryn Laboratories at Ystrad Mynach, and was later appointed chief analyst for the South-West Regional Coal Board. He joined Bowmans Chemicals Ltd., in 1947 as head of the Chemical Research Department, and his untimely death has dealt a grievous blow, not only to his department but to his many friends in Widnes.

Next Week's Events

MONDAY, 22 JANUARY

Royal Institute of Chemistry

Leeds: Chemistry Lecture Theatre, The University, 6 p.m. Miss M. Olliver: "Pectin in Industry and in the Laboratory."

Society of Chemical Industry

London: London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6 p.m. Prof. F. P. Bowden, F.R.S.: "Friction and Lubrication of Solids."

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 6 p.m. Third of Three Cantor Lectures by J. C. Swallow: "The Plastics Industry."

The Chemical Society

Newcastle: Chemistry Building, King's College, 5 p.m. Dr. K. Linderstrom-Lang: "Structure and Enzymatic Breakdown of Proteins."

TUESDAY, 23 JANUARY

Hull Chemical and Engineering Society

Hull: Church Institute, Albion Street, 7.30 p.m. D. G. Gillies, "Centrifuges."

Plastics Institute

London: Waldorf Hotel, Aldwych, W.C.2, 6.30 p.m. A. Beecham: "History and Development of Thermosetting Materials in the Rayon Industry."

Bradford Chemical Society

Bradford: Technical College, 7 p.m. Dr. G. R. Ramage: 'Pteridins."

WEDNESDAY, 24 JANUARY

Manchester Literary and Philosophical Society

Manchester: Portico Library, Mosley Street, 5.45 p.m. Dr. R. E. Fairbairn: "Chemical Literature To-day."

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2. W. P. K. Findlay: "Dry-rot and Timber."

THURSDAY, 25 JANUARY

Society of Chemical Industry

Plymouth: Technical College, Tavistock Road, 5.30 p.m. Brynmor Thomas: "The Chemist in Agriculture."

The Royal Society

London: Burlington House, Piccadilly, W.1, 4.30 p.m. Molecular Orbital Theory of Chemical Valency. Paper VII: "Molecular Structure in Terms of Equivalent Orbitols," by G. G. Hall and Sir John Lennard-Jones, F.R.S.

The Chemical Society

Manchester: Chemistry Dept., The University, 6.30 p.m. Prof. R. P. Linstead, F.R.S.: "Some Recent Developments in Macrocyclic Pigments."

Institute of Metals

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. D. J. C. Brandt: "The Use of Oxygen in Steelmaking."

Sheffield: Grand Hotel, 6.30 p.m. M. M. Hallett: "Cast Corrosion-Resisting Alloys."

FRIDAY, 26 JANUARY

Royal Institute of Chemistry

Southampton: Physics Dept., University College, 5 p.m. Dr. K. Lonsdale: "Neutron Diffraction by Crystals."

The Chemical Society

Birmingham: Chemistry Dept., The University, Edgbaston, 4.30 p.m. Prof. F. E. King: "The Structure of Recently Isolated Timber Extractives."

Cardiff: University College, 6 p.m. Prof. D. H. Hey: "Homolytic Aromatic Substitution."

St. Andrews: Chemistry Dept., United College, 5 p.m. R. S. Lumsden: "A Chemist in Industry."

SATURDAY, 27 JANUARY

Society of Leather Trades' Chemists

Manchester: Engineers' Club, Albert Square, 2 p.m. Dr. Thierry: "The Chemist's Part in Accident Prevention."

New Chemical Directory

"British Chemicals and their Manufacturers, 1951," a directory for all those interested in the buying and selling of chemicals, has just been published by the Association of British Chemical Manufacturers.

The new edition is larger than the previous one of two years ago—it has 169 pages as compared with the 141 contained in the 1949 volume—and most of the increase in size is due to the much larger number of chemicals now tabulated.

As before, proprietary names and trade names are given, and there is also a classified list of indicators and microscope stains.

Of convenient size, neatly laid out and simple to use, the new edition of the ABCM directory is virtually indispensable. Copies may be had, free, from the association, 166 Piccadilly, London, W.1.

The Stock and Chemical Markets

BUSINESS has remained more active in most sections of the stock market, encouraged earlier in the week by hopes of a cease fire in Korea and by rumours that taxation increases in the next Budget may not be as heavy as had at one time been feared. There have been renewed assumptions in the City that part of the increased cost of rearmament may be met by a Defence loan, which might be floated before April. Further taxation increases are, however, regarded as inevitable, although it is being pointed out that severe taxation of company profits would affect production. Moreover, it would be very difficult for industry to raise additional capital.

The rise in industrial shares this week has been accompanied by market hopes of further dividend increases to come, now that various leading companies have made moderate increases in their distributions—in some cases the first since the end of the war. It is felt that there can be no objection to these increases if they represent only a small part of higher earnings. Profits now being announced for 1950 have indicated considerable expansion, partly because of the greater export trade last year.

Outstanding feature among chemical and kindred shares has been a further sharp advance in Borax Consolidated deferred to 60s. following market talk of higher dividend prospects. Fisons were 26s. 6d., Monsanto 51s. 3d., and Imperial Chemical again changed hands around 43s. 4½d. British Glues & Chemicals 4s. units have been firm at 22s. 9d., with the participating preference shares up to 37s. 6d.

Albright & Wilson remained at 15s. 4½d. "ex rights" to the new bonus shares. Brotherton 10s. ordinary were 21s. 4½d., Boake Roberts 32s., and F. W. Berk 2s. 6d. shares, 12s. 6d. Bowman Chemical 4s. shares were 5s. 6d., and Amber Chemical 2s. 6d. Laporte Chemicals 5s. units changed hands up to the higher level of 11s. L. B. Holliday 4½ per cent preference kept at 19s. 6d., and W. J. Bush 5 per cent preference were 22s. 9d.

An easier tendency in Courtaulds and British Celanese reflected talk that rayon production may have to be reduced in future owing to the shortage of sulphuric acid. Following their recent small reaction, United Glass Bottle rallied to 77s. on the market view that a higher dividend or perhaps a share bonus may eventually be in prospect. Triplex Glass came back to 24s. 3d.

There was renewed activity up to the higher level of 54s. 6d. in United Molasses on a revival of share bonus hopes. Turner & Newall showed firmness at 87s. 3d., but steel sheet shortages affected sentiment in regard to a number of shares, including Metal Box which eased to 45s. 9d., and Pressed Steel at 17s. 1½d.

Limmer & Trinidad Asphalt advanced over 5s., to 50s. 3d., on the dividend and share bonus surprise. In the plastics and kindred sections, a steadier tendency was in evidence, with British Xylonite, at 91s. 3d., British Industrial Plastics 2s. shares, 7s. 3d., and Kleemann, 13s. 6d. De La Rue strengthened to 27s. 6d.

The 4s. units of the Distillers Co. have been active up to 20s. 6d. accompanied by market talk of higher dividend possibilities. British Aluminium firmed up to 40s. 3d., and in response to the higher dividend Nairn & Greenwich were up to 66s. 3d. Boots Drug at 48s. have been well maintained, Beechams deferred were 13s. 1½d., Griffiths Hughes 20s., and Sangers 23s. Glaxo Laboratories moved up to 63s. 9d.

Among oils, Anglo-Iranian eased a little, but Burmah and Trinidad Petroleum were higher, while at one time Ultramar were active up to over 32s.

Market Reports

LONDON.—A steady pressure for supplies on home and export account continues throughout the industrial chemicals market, and the supply position for anything like near delivery is becoming exceedingly difficult. Buyers are also finding contract replacement business less easy to negotiate owing to the uncertain price position and the scarcity of raw materials. Higher prices are now ruling for caustic and carbonate of potash and cream of tartar, and the whole price structure of the market is strong with a number of quotations purely nominal. In the coal tar products market the demand remains brisk with output fully absorbed. The refined products continue scarce and supplies of xylol and toluol are being reserved for priority needs.

MANCHESTER.—There has been steady trading in most of the heavy chemical products during the past week; many new inquiries have been dealt with. A number of materials have become perceptibly scarcer. Prices generally are firm and in some instances are tending to become

(continued on next page

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

LLEWELLYN RYLAND, LTD., Birmingham, varnish and paint manufacturers. (M., 20/1/51). December 8, mortgage and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on lands and premises at Balsall Heath, Birmingham, with machinery, fixtures, etc., also a general charge. *Nil. May 9, 1950.

Satisfaction

W. H. CLUBB, LTD., Liverpool, chemists. (M.S., 20/1/51). Satisfaction December 15, of mortgage registered 30 March, 1931.

Increases of Capital

The following increases of capital have been announced: THERMOS (1925), LTD., from £5000 to £50,000; JOHN PEAK & Co., LTD., from £30,000 to £40,000.

The following increases of capital have been announced: Dow Corning, Ltd., from £100 to £25,000; Cochran Chemical Co., Ltd., from £1000 to £5000.

The capital of W. Gimber & Sons, Ltd., 2 Queen's Road, Peckham, S.E.15 has been increased from £3500 to £7500.

New Registrations

G. R. Lawrence & Son, Ltd.

Private company. (490,227). Capital £12,500. Wholesale and retail chemists and druggists, chemical engineers, etc. Directors: G. R. Lawrence and Mrs. A. M. Lawrence, G. W. Jones. Reg. office: 59 High Street, Rhyl.

Leach & Burton (Chemists), Ltd.

Private company. (490,391). Capital £1500. Consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. Directors: A. E. Leach, and L. G. Burton. Reg. office: 8 Queen Street, Cheapside, E.C.

J. Manger & Son, Ltd.

Private company. (490,339). Capital £100. Chemists, druggists, drysalters, oil and colour men manufacturers of and dealers in soaps, detergents, pharmaceutical, medicinal, chemical, and other preparations, etc. Subscribers: G. Conrad and C. J. Pollard. Solicitors: Clifford-Turner & Co., 11 Old Jewry, E.C.2.

Mineral Recovery, Ltd.

Private company. (490,352). Capital £5000. Refiners of and dealers in ores, metals, minerals, and chemicals of all kinds, etc. Directors: F. T. C. Doughty, and Rt. Hon. Baron Milne. Reg. office: 50 Pall Mall, S.W.1.

THE STOCK AND CHEMICAL MARKETS

continued from previous page

higher. Copper sulphate, hydrogen peroxide and some of the barium compounds have become dearer on balance. There is a steady demand for compound fertilisers and buying interest in superphosphates and other materials in this section of the market is increasing. There is a sustained demand for most tar products and naphthalenes have reached higher prices.

GLASGOW.—Inquiries in general for business reached a new high level during the past week. Sulphur and sulphuric acid supplies are causing increased difficulties. The export market is almost at a standstill owing to shortages and increasing demands for the home market.

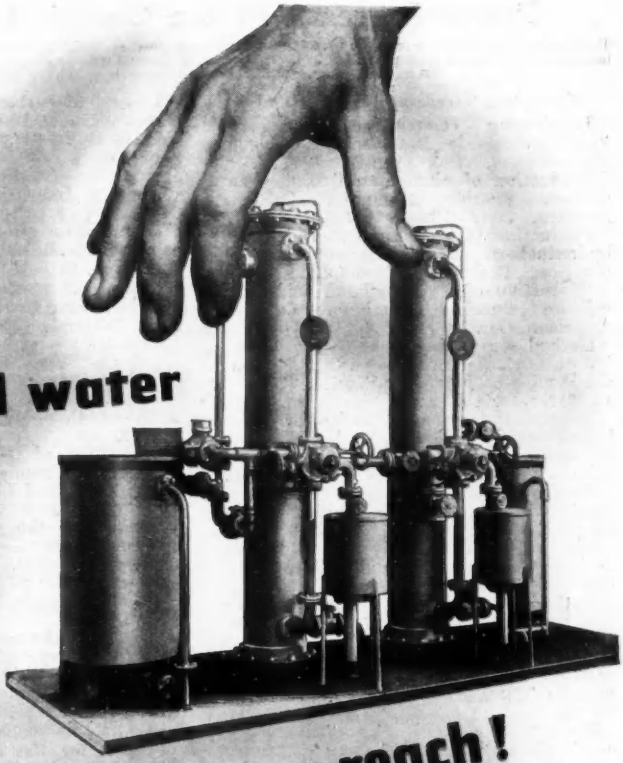
Naphthenic Acid Price Increase

OWING to increased costs, Shell Chemicals, Ltd., advise that it has had to increase the prices of its naphthenic acids.

The new prices which operate as from 1 January, 1951, are as follows:—

	N.A.9.	N.A.20.	N.A.17.
40 gal. drums ...	£112	£97 10s.	£83
1-5 tons	£111	£96 10s.	£82
5-10 tons	£110	£95 10s.	£81
10 tons and up	£109	£94 10s.	£80

Containers are on loan and charged for if not returned in good condition. Rebates, delivery conditions and terms remain unaltered.



Distilled water within your reach!

No longer need high costs place distilled water beyond your reach. **"DEMINROLIT"** equipment will produce unlimited *demineralised* water equal in quality to distillate, at a fraction of the cost of distillation. This new demineralised water can thus be used in many processes where distilled water is desirable, but far too costly.

The "DEMINROLIT" plant requires no heat. All metallic salts are removed from the water by passage through ion exchange materials. Both operation and installation are simple.

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Ion Exchange

For full details write to

The **PERMUTIT Co. Ltd.**, Dept. V.A.35, Permutit House, Gunnersbury Ave., London, W.4 CHiswick 6431

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Lubricating compositions.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 15 1947. 647,266.

Production of aluminium fluoride from calcium fluoride.—Aluminum Co. of America. Oct. 16 1947. 647,216.

Production of aluminium fluoride from hydrofluoboric acid.—Aluminum Co. of America. Oct. 16 1947. 647,217.

Production of hydrofluoboric acid from calcium fluoride.—Aluminum Co. of America. Oct. 16 1947. 647,218.

Method for producing cast irons.—Soc. D'Etudes de Recherches et D'Applications des Poudres Agglomerees S.E.R.A.P. Oct. 17 1947. 646,989.

Halogenated aromatic amine-formaldehyde-dicyandiamide resin and process for making the same.—General Aniline & Film Corporation. Oct. 21 1947. 647,220.

Thermosetting polyarylbiguanide for maldehyde resins.—General Aniline & Film Corporation. Oct. 27 1947. 647,222.

Electrical metal polishing and like devices.—A. Schmukler, and B. Schmukler. Nov. 6 1947. 647,070.

Method for production of textile fabrics with reduced shrinkage.—R. Dogger. Nov. 10 1947. 647,223.

Mechanically-driven mercury rectifiers and similar devices.—Soc. Anon. Des Ateliers de Secheron. Nov. 21 1947. 646,994.

Plastic tubing and pipe lines.—Communications Patents, Ltd., and G. Haim. Nov. 29 1948. 647,226.

Circuits for receiving frequency-modulated oscillations.—Philips Electrical, Ltd. Dec. 2 1947. 646,997.

Preparation of substituted pteridines.—American Cyanamid Co. Dec. 4 1947. 647,272.

Fabric finishing compositions and treatment.—General Aniline & Film Corporation. Dec. 5 1947. 647,273.

Diazotype composition for siliceous surfaces.—General Aniline & Film Corporation. Dec. 5 1947. 647,227.

Method for the obtention of an extra light alloy.—G. Ferriere, and A. Glazunov. Dec. 15 1947. 647,228.

Manufacture of quarternary ammonium compounds.—A. Wander Akt.-Ges. Dec. 19 1947. 647,275.

Filling machines for superphosphates and similar materials.—Billeruds Aktiebolag. Dec. 24 1947. 647,231.

Production of sintered steel.—D. Primavesi. Dec. 29 1947. 647,278.

Control of carbon in hydrocarbon synthesis.—Standard Oil Development Co. Feb. 20 1948. 647,079.

Preparation of readily soluble calcium compounds.—Geistlich Sonne Akt.-Ges Fur Chemische Industrie, E. Feb. 25 1948. 647,080.

Manufacture of thermosetting resinous compounds.—British Industrial Plastics, Ltd. Feb. 25 1948. 647,081.

Coating of photographic film.—Kodak, Ltd. (Eastman Kodak Co., T. G. Veal, and G. P. Waugh). March 25 1949. 647,093.

Manufacture of isovaleric acid.—Chemi-Synthetics, Ltd., H. Bing, E. L. Grew, and C. W. Picard. March 17 1949. 647,094.

Manufacture of copperable disazo dyestuffs.—J. R. Geigy Akt.-Ges. May 1 1948. 647,103.

Production of polymeric hydrocarbons.—Imperial Chemical Industries, Ltd., F. W. Lord, and L. B. Morgan. May 30 1949. 647,111.

Process for the production of organosiloxane polymers.—Dow Corning Corporation. July 9 1948. 647,167.

Apparatus for effecting gaseous chemical reactions.—British Celanese, Ltd. July 14 1948. 647,169.

Process for the manufacture of a benzilic acid derivative.—Roche Products, Ltd. July 23 1948. 647,173.

Production of alkyl esters of fatty acids.—E. W. E. Micklethwait. (Nopco Chemical Co.). July 23 1948. 647,174.

Process for the recovery of trimethyl silicon chloride.—Dow Corning Corporation. Aug. 9 1948. 647,181.

Polymerisation of ethylene.—H. Newby (Universal Oil Products, Co.). Aug. 13 1948. 647,175.

Varnish and paint constituents.—Plastonol, Ltd., and C. W. H. King. Sept-6 1949. 647,032.

Piezo-electric crystals.—General Electric Co., Ltd., L. A. Thomas and G. D. Brittain. Aug. 10 1949. 648,740.

Process and apparatus for destructive distillation.—D. Dalin, and T. J. Hedback. Feb. 8 1946. 648,744.

Process for coating by means of thermoplastic transfer sheets.—Sylvania Industrial Corporation. April 17 1946. 648,812.

Process for the manufacture of agglomerated fuels and fuels derived therefrom.—A. Vloeberghs. May 20 1946. 648,813.

Beta-thio carboxylic acid compounds and method of preparing same.—B. F. Goodrich Co. Sept. 4 1946. 648,672.

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PATENT PROCESSES

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Processing of synthetic and cellulosic fibres.—Textile Machinery Corporation. Sept. 18 1946. 648,815.

Process of coating and product.—American Viscose Corporation. Oct. 9 1946. 648,816.

Method and apparatus for the recovery of phenols from aqueous liquors.—Low Temperature Carbonisation, Ltd., and G. S. Pound. Feb. 23 1948. 648,752.

Manufacture of organic polymeric fibres.—American Viscose Corporation. May 1 1947. 648,830.

Process for the manufacture of aluminium soap greases.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 12 1947. 648,763.

Art of incorporating drying metals in paints, varnishes, linoleums, inks, etc.—Nuodex Products Co., Inc. July 7 1947. 648,835.

Electrolytic preparation of quinolinic acid.—Merck & Co., Inc. July 16 1947. 648,764.

Arresting of corrosion.—D. Clayton, and S. E. Bowrey. July 16 1948. 648,765.

Non-corrosive compositions.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 28 1947. 648,839.

Bonding of surfaces containing polyvinyl resins.—E. I. Du Pont de Nemours & Co., and C. C. Johnson. Aug. 24 1948. 648,840.

Manufacture of dyestuffs of the copper phthalocyanine type.—G. M. O'Neal. Oct. 29 1947. 648,688.

Process for separating components of fluorination reaction mixtures by distillation.—Kinetic Chemicals, Inc. July 80 1947. 648,689.

Methods of preserving rubber and the vulcanised rubber product resulting therefrom.—Monsanto Chemical Co. July 81 1947. 648,842.

Treatment of sugar.—Northcutt Research Corporation. July 31 1947. 648,690.

Method for the gasification of fuel having high contents of volatile matter.—Soc. Distibois. Aug. 1 1947. 648,691.

Plastic drying oil coating.—O. V. McGrew. Aug. 5 1947. 648,843.

Evaporating and concentrating apparatus.—W. C. Mason, and W. W. Hutcheson. Nov. 21 1947. 648,787.

Manufacture of carbonaceous moulding compositions suitable for extrusion and of moulded carbon products therefrom.—C.D. Patents, Ltd., C. D. Greaves, and W. D. Parker. Oct. 11 1948. 648,539.

Process for the preparation of capillary-active substances.—Sandoz, Ltd. Oct. 27 1947. 648,768.

Pest control composition.—Nuodex Products, Co., Inc. Nov. 26 1947. 648,773.

Distillation of hydrochloric acid.—Bay Chemical Co., Inc. Nov. 26 1947. 648,706.

Securing of solid inserts in sintered metal bodies.—D. Primavesi. Dec. 29 1947. 648,779.

Production of glutamic acid.—International Minerals & Chemical Corporation. Jan. 16 1948. 648,784.

Process for the manufacture of fluoranthene derivatives.—Ciba, Ltd. Jan. 22 1948. 648,786.

Methods of and means for producing stratified glass objects.—Sklarny Inwald, Narodni Podnik. March 15 1948. 648,615.

Mould for pressing glass articles especially perforated articles.—Sklarny Inwald, Narodni Podnik. March 15 1948. 648,616.

Manufacture of ester-like derivatives of ortho : ortho'-dioxy-monoazo-dyestuffs.—Ciba, Ltd. April 2 1948. 648,715.

Process for preparing an alkyl ester of alpha-cyano-acrylic acid.—B. F. Goodrich Co. April 7 1948. 648,626.

Colouration of textiles of organic derivatives of cellulose.—British Celanese, Ltd. April 15 1948. 648,725.

Inhibiting acid fading of colourations on cellulose derivative textile materials.—General Aniline & Film Corporation. April 26 1948. 648,631.

Treatment of cellulosic material.—Imperial Chemical Industries, Ltd., W. A. S. White, and N. F. Crowder. May 23 1949. 648,632.

Apparatus for the vulcanisation of rubber articles.—Dunlop Rubber Co., Ltd., J. D. Crabbe, and S. E. Harper. May 12 1949. 648,634.

Method of preparing solutions of solid vulcanised fatty oils.—K. W. Posnansky. June 25 1948. 648,640.

Phase-contrast microscopy.—P. M. Barham, and E. W. Taylor. Aug. 26 1949. 648,801.

Photographic emulsions.—E. I. Du Pont de Nemours & Co. July 30 1948.

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